

Enc. 7/1,2

Hist. lit. Encyclop. 38.

Part I.

Fundamental operations.

of geometry and algebra, there may be an opposition or contrariety in the quantities, analogous to that of addition and subtraction; and the signs + and - may very conveniently be used to express that contrariety. In such cases, negative quantities are understood to exist by themselves; and the same rules take place in operations into which they enter, as are used with regard to the negative terms of abstract quantities.

C H A P. I.

SECT. I. Fundamental Operations.

THE fundamental operations in algebra are the same as in common arithmetic, *Addition, Subtraction, Multiplication, and Division*; and from the various combinations of these four, all the others are derived.

PROB. I. To add Quantities.

Simple quantities, or the terms of compound quantities, to be added together, may be *like with like signs, like with unlike signs*, or they may be *unlike*.

Case 1. To add terms that are like and have like signs.

Rule. Add together the coefficients, to their sum prefix the common sign, and subjoin the common letter or letters.

$$\begin{array}{r} \text{Examp. To } 5ab \\ \text{Add } 4ab \\ \hline \text{Sum } 9ab \end{array} \quad \begin{array}{r} 3aa-ab \\ 7aa-2ab \\ \hline 4aa-5ab \\ 14aa-8ab. \end{array}$$

Case 2. To add terms that are like, but have unlike signs.

Rule. Subtract the less coefficient from the greater; prefix the sign of the greater to the remainder, and subjoin the common letter or letters.

$$\begin{array}{r} \text{Examp. } -4a \quad +7bc \quad -5ab \\ \quad +7a \quad -3bc \quad +2ab \\ \quad +3a \quad +bc \quad +3ab \\ \quad \quad +5bc \quad \quad \quad 0 \end{array}$$

Case 3. To add terms that are unlike.

Rule. Set them all down, one after another, with their signs and coefficients prefixed.

$$\begin{array}{r} \text{Examp. } 2a+3b \\ \quad -5c+8 \\ \hline 2a+3b-5c+8 \end{array}$$

Compound quantities are added together, by uniting the several terms of which they consist by the preceding rules.

$$\begin{array}{l} \text{Examp. The sum of } \left\{ \begin{array}{l} 5ab-3xy-12cd \\ 7xy-ab+15 \\ 9cd-4xy-4mn \end{array} \right. \\ \hline \text{is } 4ab-3cd+15-mn \end{array}$$

The rule for case 3. may be considered as the general rule for adding all algebraical quantities whatsoever; and, by the rules in the two preceding cases, the like

Vol. I. Part II.

A L G E B R A.

terms in the quantities to be added may be united, so as to render the expression of the sum more simple.

PROB. II. To subtract Quantities.

General Rule. Change the signs of the quantity to be subtracted into the contrary signs, and then add it, so changed, to the quantity from which it was to be subtracted (by Prob. I.); the sum arising by this addition is the remainder.

$$\begin{array}{r} \text{Examp. From } +5a \quad 7ab-16bc \\ \text{Subtract } +3a \quad 3ab+mb \\ \hline \text{Rem. } +2a \quad 4ab-16bc-mb \\ \text{From } 5a-7b+9c+8 \\ \text{Subt. } 2a-4b+9c-d \\ \hline \text{Rem. } 3a-3b+8+d \end{array}$$

When a positive quantity is to be subtracted, the rule is obvious from Def. 3. In order to show it, when the negative part of a quantity is to be subtracted, let $c-d$ be subtracted from a , the remainder, according to the rule, is $a-c+d$. For if c is subtracted from a , the remainder is $a-c$ (by Def. 3.); but this is too small, because c is subtracted instead of $c-d$, which is less than it by d ; the remainder therefore is too small by d ; and d being added, it is $a-c+d$, according to the rule.

Otherwise. If the quantity d be added to these two quantities a and $c-d$, the difference will continue the same; that is, the excess of a above $c-d$ is equal to the excess of $a+d$ above $c-d+d$, that is, to the excess of $a+d$ above c , which plainly is $a+d-c$, and is therefore the remainder required.

PROB. III. To multiply Quantities.

General Rule for the Signs. When the signs of the two terms to be multiplied are like, the sign of the product is +; but when the signs are unlike, the sign of the product is -.

Case 1. To multiply two terms.

Rule. Find the sign of the product by the general rule; after it place the product of the numeral coefficients, and then set down all the letters one after another, as in one word.

$$\begin{array}{r} \text{Mult. } +a \quad +5b \quad -5ax \\ \text{By } +b \quad -3c \quad -7ab \\ \hline +ab \quad -15bc \quad +35aabc \end{array}$$

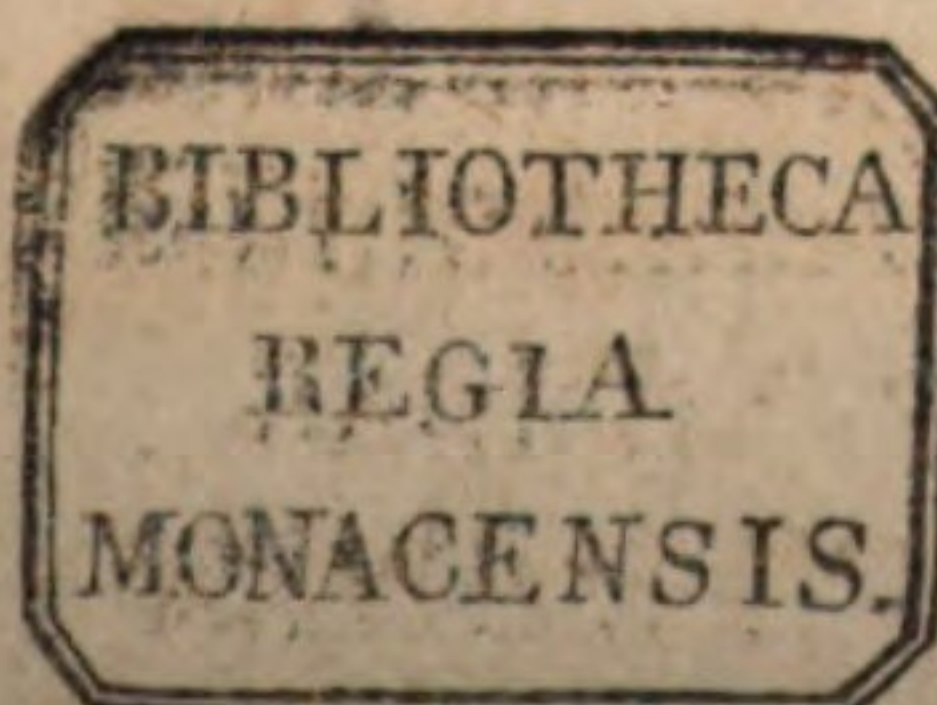
The reason of this rule is derived from Def. 6. and from the nature of multiplication, which is a repeated addition of one of the quantities to be multiplied as often as there are units in the other. Hence also the letters in two terms multiplied together may be placed in any order, and therefore the order of the alphabet is generally preferred.

Case 2. To multiply compound quantities.

Rule. Multiply every term of the multiplicand by all the terms of the multiplier, one after another, according to the preceding rule, and then collect all the products into one sum; that sum is the product required.

3 E

Examp.



Fundamen-
tal opera-
tions.Examp. Mult. $2a+3b$
By $3ax-4by$

$$\begin{array}{r}
 6aax+9abx \\
 -8aby-12bby \\
 \hline
 \text{Prod. } 6aax+9abx-8aby-12bby
 \end{array}$$

Mult. $a-b$
By $c-d$

$$\begin{array}{r}
 ac-cb \\
 -ad+db \\
 \hline
 \text{Prod. } ac-cb-ad+db
 \end{array}$$

Of the general Rule for the Signs.

The reason of that rule will appear by proving it, as applied to the last mentioned example of $a-b$ multiplied by $c-d$, in which every case of it occurs.

Since multiplication is a repeated addition of the multiplicand as often as there are units in the multiplier, hence, if $a-b$ is to be multiplied by c , $a-b$ must be added to itself as often as there are units in c , and the product therefore must be $ca-cb$ (Prob. I.).

But this product is too great; for $a-b$ is to be multiplied, not by c , but by $c-d$ only, which is the excess of c above d ; d times $a-b$ therefore, or $da-db$, has been taken too much; hence this quantity must be subtracted from the former part of the product, and the remainder, which (by Prob. II.) is $ca-cb-da+db$, will be the true product required.

Def. 12. When several quantities are multiplied together, any of them is called a *factor* of the product.

13. The products arising from the continual multiplication of the same quantity are called the *powers* of that quantity, which is the root. Thus, aa , aaa , $aaaa$, &c. are powers of the root a .

14. These powers are expressed, by placing above the root, to the right hand, a figure, denoting how often the root is repeated. This figure is called an *index*, or *exponent*, and from it the power is denominated. Thus,

$$\begin{array}{l}
 a \\
 aa \\
 aaa \\
 aaaa
 \end{array}
 \left. \begin{array}{l} \text{is called} \\ \text{the} \end{array} \right\} \begin{array}{l} 1^{\text{st}} \\ 2^{\text{d}} \\ 3^{\text{d}} \\ 4^{\text{th}} \end{array} \left\{ \begin{array}{l} \text{Power of the root} \\ a, \text{ and is other-} \\ \text{wise expressed} \\ \text{by} \end{array} \right\} \begin{array}{l} a^1 \text{ or } a \\ a^2 \\ a^3 \\ a^4 \end{array}$$

The 2^d and 3^d powers are generally called the *square* and *cube*; and the 4th, 5th, and 6th, are also sometimes respectively called the *biquadrate*, *sur-solid*, and *cubocube*.

Cor. Powers of the same root are multiplied by adding their exponents. Thus, $a^2 \times a^3 = a^5$, or $aaa \times aa = aaaaa$, $b^3 \times b = b^4$.

Scholium.

Sometimes it is convenient to express the multiplication of quantities, by setting them down with the sign ($\times$) between them, without performing the operation according to the preceding rules; thus $a^2 \times b$ is written instead of a^2b ; and $a-b \times c-d$ expresses the product of $a-b$, multiplied by $c-d$.

Def. 15. A *vinculum* is a line drawn over any num-

ber of terms of a compound quantity, to denote those which are understood to be affected by the particular sign connected with it.

Thus, in the last example, it shows that the terms $+a$ and $-b$, and also c and $-d$ are all affected by the sign ($\times$). Without the vinculum, the expression $a-b \times c-d$ would mean the excess of a above bc and d ; and $a-b \times c-d$ would mean the excess of the product of $a-b$ by c , above d . Thus also, $(a+b)^2$ expresses the second power of $a+b$, of the product of that quantity multiplied by itself; whereas $a+b^2$ would express only the sum of a and b^2 ; and so of others. By some writers a parenthesis () is used as a vinculum, and $(a+b)^2$ is the same thing as $\overline{a+b}^2$.

PROB. IV. To divide Quantities.

General Rule for the Signs. If the signs of the divisor and dividend are like, the sign of the quotient is $+$; if they are unlike, the sign of the quotient is $-$.

This rule is easily deduced from that given in Prob. III.; for, from the nature of division, the quotient must be such a quantity as, multiplied by the divisor, shall produce the dividend with its proper sign.

From Def. 8. the quotient of any two quantities may be expressed, by placing the dividend above a line and the divisor below it. But a quotient may often be expressed in a more simple and convenient form, as will appear from the following distinction of the cases.

Case I. When the divisor is simple, and is a factor of all the terms of the dividend. This is easily discovered by inspection; for then the coefficient of the divisor measures that of all the terms of the dividend, and all the letters of the divisor are found in every term of the dividend.

Rule. The letter or letters in the divisor are to be expunged out of each term in the dividend, and the coefficients of each term to be divided by the coefficient of the divisor; the quantity resulting is the quotient.

$$\text{Ex. } a) ab(b. \quad 2aab) \quad 6a^2bc-4a^2bdc \quad (3ac-2dm.$$

The reason of this is evident from the nature of division, and from Def. 6. *Note.* It is obvious from corollary to Prob. III. that powers of the same root are divided by subtracting their exponents.

$$\text{Thus } a^2) a^3 (a \quad a^3) a^7 (a^4. \quad \text{Also } a^2b) a^3b^5 (ab^3.$$

Case II. When the divisor is simple, but not a factor of the dividend.

Rule. The quotient is expressed by a fraction, according to Def. 8. viz. by placing the dividend above a line and the divisor below it.

Thus, the quotient of $3ab^2$ divided by $2mbc$ is the fraction $\frac{3ab^2}{2mbc}$.

Such expressions of quotients may often be reduced to a more simple form, as shall be explained in the second part of this chapter.

Case III. When the divisor is compound.

Rule.

Fundamen-
tal opera-
tions.

Rule I. The terms of the dividend are to be ranged according to the powers of some one of its letters; and those of the divisor, according to the powers of the same letter.

Thus, if $a^2 + 2ab + b^2$ is the dividend, and $a + b$ the divisor, they are ranged according to the powers of a .

2. The first term of the dividend is to be divided by the first term of the divisor (observing the general rule for the signs); and this quotient being set down as a part of the quotient wanted, is to be multiplied by the whole divisor, and the product subtracted from the dividend. If nothing remain, the division is finished: the remainder, when there is any, is a new dividend.

Thus, in the preceding example, a^2 divided by a , gives a , which is the first part of the quotient wanted: and the product of this part by the whole divisor $a + b$, viz. $a^2 + ab$ being subtracted from the given dividend, there remains in this example $ab + b^2$.

3. Divide the first term of this new dividend by the first term of the divisor as before, and join the quotient to the part already found, with its proper sign: then multiply the whole divisor by this part of the quotient, and subtract the product from the new dividend; and thus the operation is to be continued till no remainder is left, or till it appear that there will always be a remainder.

Thus, in the preceding example, $+ab$, the first term of the new dividend divided by a , gives b ; the product of which, multiplied by $a + b$, being subtracted from $ab + b^2$, nothing remains, and $a + b$ is the true quotient. The entire operation is as follows.

$$\begin{array}{r}
 a+b \overline{) a^2 + 2ab + b^2} \\
 \underline{a^2 + ab} \\
 ab + b^2 \\
 \underline{ab + b^2} \\
 0
 \end{array}$$

$$\begin{array}{r}
 3a-b \overline{) 3a^3 - 12a^2 - a^2b + 10ab - 2b^2} \\
 \underline{3a^3} \\
 -12a^2 \\
 \underline{-12a^2} \\
 +10ab \\
 \underline{ +10ab} \\
 -2b^2 \\
 \underline{ -2b^2} \\
 0
 \end{array}$$

$$\begin{array}{r}
 1-a \overline{) 1 + a + a^2 + a^3, \&c.} \\
 \underline{1-a} \\
 +a \\
 \underline{+a} \\
 +a^2 \\
 \underline{ +a^2} \\
 +a^3 \\
 \underline{ +a^3} \\
 +a^4, \&c.
 \end{array}$$

It often happens, as in the last example, that there

is still a remainder from which the operation may be continued without end. This expression of a quotient is called an *infinite series*; the nature of which shall be considered afterwards. By comparing a few of the first terms, the law of the series may be discovered, by which, without any more division, it may be continued to any number of terms wanted.

Of the General Rule.

The reason of the different parts of this rule is evident; for, in the course of the operation, all the terms of the quotient obtained by it are multiplied by all the terms of the divisor, and the products are successively subtracted from the dividend till nothing remain: that, therefore, from the nature of division, must be the true quotient.

Note. The sign $\div$ is sometimes used to express the quotient of two quantities between which it is placed: Thus, $a^2 + x^2 \div a + x$, expresses the quotient of $a^2 + x^2$ divided by $a + x$.

§ 2. OF FRACTIONS.

Definitions.

1. WHEN a quotient is expressed by a fraction, the divisor above the line is called the *numerator*; and the divisor below it is called the *denominator*.
2. If the numerator is less than the denominator, it is called a *proper fraction*.
3. If the numerator is not less than the denominator, it is called an *improper fraction*.
4. If one part of a quantity is an integer, and the other a fraction, it is called a *mixt quantity*.
5. The *reciprocal* of a fraction, is a fraction whose numerator is the denominator of the other; and whose denominator is the numerator of the other. The reciprocal of an integer is the quotient of 1 divided by that integer. Thus, $\frac{b}{a}$ is the reciprocal of $\frac{a}{b}$; and $\frac{1}{m}$ is the reciprocal of m .

The distinctions in Def. 2, 3, 4, properly belong to common arithmetic, from which they are borrowed, and are scarcely used in algebra.

The operations concerning fractions are founded on the following proposition:

If the divisor and dividend be either both multiplied or both divided by the same quantity, the quotient is the same; or, if both the numerator and denominator of the fraction be either multiplied or divided by the same quantity, the value of that fraction is the same.

Thus, let $\frac{a}{b} = c$, then $\frac{ma}{mb} = c$. For, from the nature of division, if the quotient $\frac{a}{b} (=c)$ be multiplied by the divisor b , the product must be the dividend a . Hence $(\frac{a}{b} \times b) = a$, and likewise $ma = mbc$, and dividing both by mb , $\frac{ma}{mb} = c$. Conversely, if $\frac{ma}{mb} = c$, then also $\frac{a}{b} = c$.

Fundamen-
tal opera-
tions.

Cor. 1. Hence a fraction may be reduced to another of the same value, but of a more simple form, by dividing both numerator and denominator by any common measure.

$$\text{Thus, } \frac{30ax - 54ay}{12ab} = \frac{5x - 9y}{2b}.$$

$$\frac{8ab + 5ac}{4a^2} = \frac{4b + 3c}{2a}.$$

Cor. 2. A fraction is multiplied by any integer, by multiplying the numerator, or dividing the denominator by that integer; and conversely, a fraction is divided by any integer, by dividing the numerator, or multiplying the denominator by that integer.

PROB. I. To find the greatest common Measure of two Quantities.

1. Of pure numbers.

Rule. Divide the greater by the less; and, if there is no remainder, the less is the greatest common measure required. If there is a remainder, divide the last divisor by it; and thus proceed, continually dividing the last divisor by its remainder, till no remainder is left, and the last divisor is the greatest common measure required.

The greatest common measure of 45 and 63 is 9; the greatest common measure of 187 and 391 is 17. Thus,

$$\begin{array}{r} 45 \overline{)63} \\ \underline{45} \end{array}$$

$$\begin{array}{r} 18 \overline{)45} \\ \underline{36} \end{array}$$

$$\begin{array}{r} 9 \overline{)18} \\ \underline{18} \end{array}$$

0

$$\begin{array}{r} 187 \overline{)391} \\ \underline{374} \end{array}$$

$$\begin{array}{r} 17 \overline{)187} \\ \underline{187} \end{array}$$

*

From the nature of this operation, it is plain that it may always be continued till there be no remainder. The rule depends on the two following principles:

1. A quantity which measures both divisor and remainder must measure the dividend.

2. A quantity which measures both divisor and dividend must also measure the remainder.

For a quantity which measures two other quantities, must also measure both their sum and difference; and, from the nature of division, the dividend consists of the divisor repeated a certain number of times, together with the remainder. By the first it appears, that the number found by this rule is a common measure; and, by the second, it is plain there can be no greater common measure; for, if there were, it must necessarily measure the quantity already found less than itself, which is absurd.

When the greatest common measure of algebraical quantities is required, if either of them be simple, any common simple divisor is easily found by inspection. If they are both compound, any common simple divisor may also be found by inspection. But, when the greatest compound divisor is wanted, the preceding rule is to be applied; only,

2. The simple divisors of each of the quantities are to be taken out, the remainders in the several operations are also to be divided by their simple divisors, and the quantities are always to be ranged according to the powers of the same letter.

The simple divisors in the given quantities, or in the remainders, do not affect a compound divisor which is wanted; and hence also, to make the division succeed, any of the dividends may be multiplied by a simple quantity. Besides the simple divisors in the remainders not being found in the divisors from which they arise, can make no part of the common measure sought; and for the same reason, if in such a remainder there be any compound divisor which does not measure the divisor from which it proceeds, it may be taken out.

EXAMPLES.

$$\begin{array}{r} a^2 - b^2 \overline{)a^2 - 2ab + b^2} \\ \underline{a^2 - b^2} \end{array}$$

$$\begin{array}{r} -2ab + 2b^2 \text{ Remainder, which} \\ \text{divided by } -2b \text{ is } a - b \overline{)a^2 - b^2} \\ \underline{a^2 - b^2} \end{array}$$

* *

If the quantities given are $8a^2b^3 - 10ab^3 + 2b^4$, and $9a^4b - 9a^3b^2 + 3a^2b^3 - 3ab^4$. The simple divisors being taken out, viz. $2b^2$ out of the first, it becomes $4a^2 - 5ab + b^2$, and $3ab$ out of the second, it is $3a^3 - 3a^2b + ab^2 - b^3$. As the latter is to be divided by the former, it must be multiplied by 4, to make the operation succeed, and then it is as follows:

$$\begin{array}{r} 4a^2 - 5ab^2 \overline{)12a^3 - 12a^2b + 4ab^2 - 4b^3} \\ \underline{12a^3 - 15a^2b + 3ab^2} \\ \hline 3a^2b + ab^2 - 4b^3 \end{array}$$

This remainder is to be divided by b , and the new dividend multiplied by 3, to make the division proceed. Thus,

$$\begin{array}{r} 3a^2 + ab - 4b^2 \overline{)12a^2 - 15ab + 3b^2} \\ \underline{12a^2 + 4ab - 16b^2} \\ \hline -19ab + 19b^2 \end{array}$$

and this remainder, divided by $-19b$, gives $a - b$, which being made a divisor, divides $3a^2 + ab - 4b^2$ without a remainder, and therefore $a - b$ is the greatest compound divisor: but there is a simple divisor b , and therefore $a - b \times b$ is the greatest common measure required.

PROB. II. To reduce a Fraction to its lowest Terms.

Rule. Divide both numerator and denominator by their greatest common measure, which may be found by Prob. I.

Thus, $\frac{75abc}{125bcx} = \frac{3a}{5x}$, $25bc$ being the greatest common measure, $\frac{a^4 - b^4}{a^2 - a^3b^2} = \frac{a^2 + b^2}{a^3}$. Also, $\frac{9a^4b - 9a^3b^2 + 3a^2b^3 - 3ab^4}{8a^2b^2 - 10ab^3 + 2b^4} = \frac{9a^3 + 3ab^2}{8ab - 2b^2}$ the greatest common measure being $a - b \times b$, by Prob. I.

PROB.

Part. I.

A L G E B R A.

Fundamen-
tal opera-
tions. PROB. III. To reduce an Integer to the Form of a Fraction.

Rule. Multiply the given integer by any quantity for a numerator, and set that quantity under the product for a denominator.

$$\text{Thus, } a = \frac{ma}{m}, a + b = \frac{a^2 - b^2}{a - b}$$

Cor. Hence, in the following operations concerning fractions, an integer may be introduced; for, by this problem, it may be reduced to the form of a fraction. The denominator of an integer is generally made 1.

PROB. IV. To reduce Fractions with different Denominators to Fractions of equal Value, that shall have the same Denominator.

Rule. Multiply each numerator, separately taken, into all the denominators but its own, and the products shall give the new numerators. Then multiply all the denominators into one another, and the product shall give the common denominator.

Example. Let the fractions be $\frac{a}{b}, \frac{c}{d}, \frac{e}{f}$ they are respectively equal to $\frac{adf}{bdf}, \frac{bcf}{bdf}, \frac{bde}{bdf}$

The reason of the operation appears from the preceding proposition; for the numerator and denominator of each fraction are multiplied by the same quantities; and the value of fractions therefore is the same.

PROB. V. To add and subtract Fractions.

Rule. Reduce them to a common denominator, then add or subtract the numerators; and the sum or difference set over the common denominator is the sum or remainder required.

Ex. Add together $\frac{a}{b}, \frac{c}{d}, \frac{e}{f}$ the sum is $\frac{adf + cbf + bde}{bdf}$

From $\frac{a}{b}$ subtr. $\frac{c}{d}$ the difference is $\frac{ad - bc}{bd}$

From the nature of division it is evident, that, when several quantities are to be divided by the same divisor, the sum of the quotients is the same with the quotient of the sum of the quantities divided by that common divisor.

In like manner, the difference of two fractions having the same denominator, is equal to the difference of the numerators divided by that common denominator.

Cor. 1. By Cor. Prob. 3. integers may be reduced to the form of fractions, and hence integers and fractions may be added and subtracted by this rule. Hence also what is called a mixed quantity may be reduced into the form of a fraction by bringing the integral part into the form of a fraction, with the same denominator as the fractional part, and adding or subtracting the numerators according as the two parts are connected by the signs + or -.

$$\text{Thus, } b + \frac{c}{d} = \frac{bd + c}{d} \text{ and } a - \frac{a^2 - b^2}{2a} = \frac{2a^2 - a^2 + b^2}{2a} = \frac{a^2 + b^2}{2a}$$

Cor. 2. A fraction, whose numerator is a compound quantity, may be distinguished into parts, by dividing the numerator into several parts, and setting each over the original denominator, and uniting the new fractions (reduced if necessary) by the signs of their numerators.

$$\text{Thus, } \frac{a^2 - 2ab + b^2}{2a} = \frac{a^2}{2a} - \frac{2ab}{2a} + \frac{b^2}{2a} = \frac{a}{2} - b + \frac{b^2}{2a}$$

PROB. VI. To multiply Fractions.

Rule. Multiply their numerators into one another, to obtain the numerator of the product; and the denominators, multiplied into one another, shall give the denominator of the product.

$$\text{Ex. } \frac{a}{b} \times \frac{c}{d} = \frac{ac}{bd} \quad \frac{a+b}{c} \times \frac{a-b}{d} = \frac{a^2 - b^2}{cd}$$

For, if $\frac{a}{b}$ is to be multiplied by c , the product is $\frac{ca}{b}$;

but if it is to be multiplied only by $\frac{c}{d}$, the former product must be divided by d , and it becomes $\frac{ca}{bd}$ (Cor. 2. to the preceding problem.)

Or, let $\frac{a}{b} = m$, and $\frac{c}{d} = n$. Then $a = bm$, and $c = dn$, and $ac = bdmn$, and $(mn) \frac{a}{b} \times \frac{c}{d} = \frac{ac}{bd}$.

PROB. VII. To divide Fractions.

Rule. Multiply the numerator of the dividend by the denominator of the divisor; their product shall give the numerator of the quotient. Then multiply the denominator of the dividend by the numerator of the divisor, and their product shall give the denominator.

Or, Multiply the dividend by the reciprocal of the divisor; the product will be the quotient wanted.

$$\text{Thus, } \frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c} = \frac{ad}{bc}$$

For, if $\frac{c}{d}$ is to be divided by a , the quotient is $\frac{c}{ad}$;

but $\frac{c}{d}$ is to be divided, not by a , but by $\frac{a}{b}$; therefore the former quotient must be multiplied by b , and it is $\frac{bc}{da}$.

Or, let $\frac{a}{b} = m$, and $\frac{c}{d} = n$; then $a = bm$, and $c = dn$; also $ad = bdm$ and $bc = bdn$; therefore $\left(\frac{bdn}{bdm}\right) \frac{n}{m} = \frac{bc}{ad}$.

Scholium.

By these problems, the four fundamental operations may be performed, when any terms of the original quantities, or of those which arise in the course of the operation, are fractional.

Ex.

$$\begin{array}{r}
 \text{Mult. } \frac{a^2}{2x} - \frac{3ax}{2b} \\
 \text{By } \frac{ab}{3x} - 4x \\
 \hline
 \text{Prod. } \frac{a^3b}{6x^2} - \frac{a^2}{2} - 2a^2 + \frac{6ax^2}{b} \\
 \hline
 a+x) a^2 + x^2 (a-x + \frac{2x^2}{a} - \frac{2x^3}{a^2}, \&c. \\
 \underline{a^2 + ax} \\
 -ax + x^2 \\
 \underline{-ax - x^2} \\
 2x^2 \\
 \underline{2x^2 + 2x^3} \\
 \hline
 a \\
 \hline
 \frac{2x^3}{a} \\
 \hline
 \frac{2x^3}{a} - \frac{2x^4}{a^2} \\
 \hline
 + \frac{2x^4}{a^2}, \&c.
 \end{array}$$

This quotient becomes a series, of which the law of continuation is obvious, without any farther operation.

In such cases, when we arrive at a remainder of one term, it is commonly set down with the divisor below it, after the other terms of the quotient, which then becomes a mixt quantity. Thus the last quotient is also expressed by $a-x + \frac{2x^2}{a+x}$.

CHAPTER II.

Of Proportion.

By the preceding operations quantities of the same kind may be compared together.

The relation arising from this comparison is called *ratio* or *proportion*, and is of two kinds. If we consider the difference of the two quantities, it is called *arithmetical proportion*; and if we consider their quotient, it is called *geometrical proportion*. This last being most generally useful, is commonly called simply *proportionals*.

1. Of Arithmetical Proportion.

Definition. When of four quantities the difference of the first and second is equal to the difference of the third and fourth, the quantities are called *arithmetical proportionals*.

Cor. Three quantities may be arithmetically proportional, by supposing the two middle terms of the four to be equal.

Prop. In four quantities arithmetically proportional, the sum of the extremes is equal to the sum of the means.

Let the four be a, b, c, d . Therefore from Def. $a-b=c-d$; to these add $b+d$ and $a+d=b+c$.

Cor. 1. Of four arithmetical proportionals, any three being given, the fourth may be found.

Thus, let a, b, c , be the 1st, 2d, and 4th terms, and let x be the 3d which is sought.

Then by def. $a+c=b+x$, and $x=a+c-b$.

Cor. 2. If three quantities be arithmetical proportionals, the sum of the extremes is double of the middle term; and hence, of three such proportionals, any two being given, the third may be found.

2. Of Geometrical Proportion.

Definition. If of four quantities, the quotient of the first and second is equal to the quotient of the third and fourth, these quantities are said to be in *geometrical proportion*. They are also called *proportionals*. Thus, if a, b, c, d , are the four quantities, then $\frac{a}{b} = \frac{c}{d}$, and their ratio is thus denoted $a:b::c:d$.

Cor. Three quantities may be geometrical proportionals, viz. by supposing the two middle terms of the four to be equal. If the quantities are a, b, c , then $\frac{a}{b} = \frac{b}{c}$, and the proportion is expressed thus, $a:b:c$.

Prop. I. The product of the extremes of four quantities geometrically proportional is equal to the product of the means; and conversely.

Let $a:b::c:d$.

Then by Def. $\frac{a}{b} = \frac{c}{d}$

and multiplying both by bd , $ad=bc$.

If $ad=bc$, then dividing by bd , $\frac{a}{b} = \frac{c}{d}$, that is, $a:b::c:d$.

Cor. 1. The product of the extremes of three quantities, geometrically proportional, is equal to the square of the middle term.

Cor. 2. Of four quantities geometrically proportional, any three being given, the fourth may be found.

Ex. Let a, b, c , be the three first; to find the 4th. Let it be x , then $a:b::c:x$, and by this proposition,

$ax=bc$
and dividing both by a , $x = \frac{bc}{a}$.

This coincides with the Rule of Three in arithmetic, and may be considered as a demonstration of it. In applying the rule to any particular case, it is only to be observed, that the quantities must be so connected and so arranged, that they be proportional, according to the preceding definition.

Cor. 3. Of three geometrical proportionals, any two being given, the third may be found.

Prop. II. If four quantities be geometrically proportional, then if any equimultiples whatever be taken of the first and third, and also any equimultiples whatever of the second and fourth; if the multiple of the first be greater than that of the second, the multiple of the third will be greater than that of the fourth; and if equal, equal; and if less, less.

For, let a, b, c, d , be the four proportionals. Of the

Of Equations.

the first and third, ma and mc may represent any equimultiples whatever, and also nb , nd , may represent any equimultiples of the second and fourth. Since $a:b::c:d$, $ad=bc$; and hence multiplying by mn , $mnad=mnbc$, and therefore (Conv. Prop. 1.) $ma:nb::mc:nd$; and from the definition of proportionals, it is plain, that if ma is greater than nb , mc must be greater than nd ; and if equal, equal; and if less, less.

Prop. III. If four quantities are proportionals, they will also be proportionals when taken alternately or inversely, or by composition, or by division, or by conversion. See Def. 13. 14. 15. 16. 17. of Book V. of Euclid, Simson's edition.

By Prop. II. they will also be proportionals according to Def. 5. Book V. of Euclid; and therefore this proposition is demonstrated by propositions 16, B, 18, 17, E, of the same book.

Otherwise algebraically.

Let $a:b::c:d$, and therefore $ad=bc$.

Altern. $a:c::b:d$

Invert. $b:a::d:c$

Divid. $a-b:b::c-d:d$

Comp. $a+b:b::c+d:d$

Convert. $a:a-b::c-d$

For since $ad=bc$, it is obvious, that in each of these cases the product of the extremes is equal to the product of the means; the quantities are therefore proportionals. (Prop. 1.)

Prop. IV. If four numbers be proportionals, according to Def. 5. V. B. of Euclid, they will be geometrically proportional, according to the preceding definition.

1st, Let the four numbers be integers, and let them be a, b, c, d . Then if b times a and b times c be taken, and also a times b and a times d , since ba the multiple of the first is equal to ab the multiple of the second, bc the multiple of the third, must be equal to ad the multiple of the fourth. And since $bc=ad$, by Prop. 1. a, b, c , and d , must be geometrical proportionals.

2^{dly}, If any of the numbers be fractional, all the four being multiplied by the denominator of the fractions, they continue proportionals, according to Def. 5. B. V. Euclid (by Prop. 4. of that book); and the four integer quantities produced being such proportionals, they will be geometrical proportionals, by the first part of this prop.; and therefore being reduced by division to their original form, they manifestly will remain proportionals, according to the algebraical definition.

CHAP III.

SECT. I. Of Equations in general, and of the Solution of simple Equations.

Definitions.

1. An Equation may in general be defined to be a proposition asserting the equality of two quantities;

and is expressed by placing the sign $=$ between them.

2. When a quantity stands alone upon one side of an equation, the quantities on the other side are said to be a value of it. Thus in the equation $x=b+y-d$, x stands alone on one side, and $b+y-d$ is a value of it.

3. When an unknown quantity is made to stand alone on one side of an equation, and there are only known quantities on the other, that equation is said to be resolved; and the value of the unknown quantity is called a root of the equation.

4. Equations containing only one unknown quantity and its powers, are divided into orders, according to the highest power of the unknown quantity to be found in any of its terms.

If the highest power of the unknown quantity in any term be the

1 st ,	} The Equation is called	Simple,
2 ^d ,		Quadrat,
3 ^d , &c.		Cubic, &c.

But the exponents of the unknown quantities are supposed to be integers, and the equation is supposed to be cleared of fractions, in which the unknown quantity, or any of its powers, enter the denominators.

Thus, $x + a = \frac{3x-b}{c}$ is a simple equation; $3x - \frac{5}{2x} = 12$, when cleared of the fraction by multiplying both sides by $2x$, becomes $6x^2 - 5 = 24x$ a quadratic. $x^3 - 2x^2 = x^6 - 20$ is an equation of the sixth order, &c.

As the general relations of quantity which may be treated of in algebra, are almost universally either that of equality, or such as may be reduced to that of equality, the doctrine of equations becomes one of the chief branches of the science.

The most common and useful application of algebra is in the investigation of quantities that are unknown, from certain given relations to each other, and to such as are known; and hence it has been called the *analytical art*. The equations employed for expressing these relations must therefore contain one or more unknown quantities; and the principal business of this art will be, the deducing equations containing only one unknown quantity, and resolving them.

The solution of the different orders of equations will be successively explained. The preliminary rules in the following section are useful in all orders, and are alone sufficient for the solution of simple equations.

§ 1. Of simple Equations, and their Resolution.

Simple equations are resolved by the four fundamental operations already explained; and the application of them to this purpose is contained in the following rules.

Rule 1. Any quantity may be transposed from one side of an equation to the other, by changing its sign.

Thus, if $3x - 10 = 2x + 5$

Then, $3x - 2x = 10 + 5$ or $x = 15$

Thus also, $5x + b = a + 2x$

By transp. $3x = a - b$.

This rule is obvious from prob. 1. and 2.; for it is equivalent to adding equal quantities to both sides of the equation, or to subtracting equal quantities from both sides.

Cor.

Of Equa-
tion.

Cor. The signs of all the terms of an equation may be changed into the contrary signs, and it will continue to be true.

Rule 2. Any quantity by which the unknown quantity is multiplied may be taken away, by dividing all the other quantities of the equation by it.

Thus, if $ax = b$

$$x = \frac{b}{a}$$

Also, if $mx + nb = am$

$$x + \frac{nb}{m} = a$$

For if equal quantities are divided by the same quantity, the quotients are equal.

Rule 3. If a term of an equation is fractional, its denominator may be taken away, by multiplying all the other terms by it.

Thus, if $\frac{x}{a} = b + c$

$$x = ab + ac$$

Also, if $a - \frac{b}{x} = c$

$$ax - b = cx$$

And by transf. $ax - cx = b$

$$\text{And by div. } x = \frac{b}{a - c}$$

For if all the terms of the equation are multiplied by the same quantity, it remains a true proposition.

Corollary to the three last Rules.

If any quantity be found on both sides of the equation, with the same sign, it may be taken away from both. (Rule 1.)

Also, if all the terms in the equation are multiplied or divided by the same quantity, it may be taken out of them all. (Rule 2. and 3.)

Ex. If $3x + a = a + b$, then $3x = b$.

If $2ax + 3ab = ma + a^2$, then $2x + 3b = m + a$.

If $\frac{x}{3} - \frac{4}{3} = \frac{16}{3}$, then $x - 4 = 16$.

Any simple equation may be resolved by these rules in the following manner. 1st, Any fraction may be taken away by R. 3. 2^{dly}, All the terms including the unknown quantity, may be brought to one side of the equation, and the known terms to the other, by R. 1. 3^{dly}, If the unknown quantity is multiplied by any known quantity, it may be made to stand alone by R. 2. and the equation will then be resolved. Def. 3.

Examples of simple Equations resolved by these Rules.

I.

$$\text{If } 3x + 5 = x + 9$$

$$\text{R. 1. } 2x = 4$$

$$\text{R. 2. } x = \frac{4}{2} = 2.$$

II.

$$\text{If } 5x - \frac{5x}{2} + 12 = \frac{4x}{3} + 26$$

$$\text{R. 1. } 5x - \frac{5x}{2} - \frac{4x}{3} = 14$$

$$\text{R. 3. } 30x - 15x - 8x = 84.$$

N^o 11.

Or

$$7x = 84$$

$$\text{R. 2. } x = \frac{84}{7} = 12.$$

III.

$$\text{If } \frac{5}{x} + \frac{9}{4} = 16$$

$$\text{R. 3. } \frac{20}{x} + 9 = 64$$

$$\text{R. 3. } 20 + 9x = 64x$$

$$\text{R. 1. } 20 = 55x$$

$$\text{R. 2. } x = \frac{20}{55} = \frac{4}{11}$$

§ 2. Solution of Questions producing simple Equations.

From the resolution of equations we obtain the resolution of a variety of useful problems, both in pure mathematics and physics, and also in the practical arts founded upon these sciences. In this place, we consider the application of it to those questions where the quantities are expressed by numbers, and their magnitude alone is to be considered.

When an equation, containing only one unknown quantity, is deduced from the question by the following rules, it is sometimes called a *final equation*. If it be simple, it may be resolved by the preceding rules; but if it be of a superior order, it must be resolved by the rules afterwards to be explained. The examples in this chapter are so contrived, that the final equation may be simple.

The rules given in this section for the solution of questions, though they contain a reference to simple equations only, are to be considered as general, and as applicable to questions which produce equations of any order.

General Rule. The unknown quantities in the question proposed must be expressed by letters, and the relations of the known and unknown quantities contained in it, or the conditions of it, as they are called, must be expressed by equations. These equations being resolved by the rules of this science, will give the answer of the question.

For example, if the question is concerning two numbers, they may be called x and y , and the conditions from which they are to be investigated must be expressible by equations.

Thus, if it be required that the sum of two numbers sought be 60, that condition is expressed thus:

$$x + y = 60$$

If their difference must be 24, then

$$x - y = 24$$

If their product is 1640, then

$$xy = 1640$$

If their quotient must be 6, then

$$\frac{x}{y} = 6$$

If their ratio is as 3 to 2, then

$$2x = 3y.$$

These are some of the relations which are most easily expressed. Many others occur which are less obvious; but as they cannot be described in particular rules, the algebraical expression of them is best explained by examples, and must be acquired by experience.

A

Of Equations.

A distinct conception of the nature of the question, and of the relations of the several quantities to which it refers, will generally lead to the proper method of stating it, which in effect may be considered only as a translation from common language into that of algebra.

Case I. When there is only one unknown quantity to be found.

Rule. An equation involving the unknown quantity must be deduced from the question (by the general rule). This equation being resolved by the rules of the last section, will give the answer.

It is obvious, that, when there is only one unknown quantity, there must be only one independent equation contained in the question; for any other would be unnecessary, and might be contradictory to the former.

Example. 1. To find a number, to which if there be

Let his first stock be
Of which he spends the first year L. 100, and there remains
This remainder is increased by a third of itself
The second year he spends L. 100, and there remains
He increases the remainder by one-third of it
The third year he spends L. 100, and there remains
He increases it by one-third
But at the end of the third year his stock is doubled; therefore
By R. 3.
By R. 1.
By R. 2.

Therefore his stock was L. 1480; which being tried, answers the conditions of the question.

Case II. When there are two unknown quantities.

Rule. Two independent equations involving the two unknown quantities, must be derived from the question. A value of one of the unknown quantities must be derived from each of the equations: and these two values being put equal to each other, a new equation will arise, involving only one unknown quantity, and may therefore be resolved by the preceding rule.

Two equations must be deduced from the question: for, from one including two unknown quantities, it is plain, a known value of either of them cannot be obtained, more than two equations would be unnecessary; and if any third condition were assumed at pleasure, most probably it would be inconsistent with the other two, and a question containing three such conditions would be absurd.

It is to be observed, however, that the two conditions, and hence the two equations expressing them, must be independent; that is, the one must not be deducible from the other by any algebraical reasoning: for, otherwise, there would in effect be only one equation.

Vol. I. Part I.

added a half, a third part, and a fourth part of itself, the sum will be 50.

Let it be z : then half of it is $\frac{z}{2}$, a third of it $\frac{z}{3}$, &c.

Therefore, $z + \frac{z}{2} + \frac{z}{3} + \frac{z}{4} = 50$

$$24z + 12z + 8z + 6z = 1200$$

$$50z = 1200$$

$$z = 24$$

If the operation be more complicated, it may be useful to register the several steps of it, as in the following

Example. 2. A trader allows L. 100 per annum for the expences of his family, and augments yearly that part of his stock which is not so expended by a third part of it; at the end of three years his original stock was doubled. What had he at first?

1	z
2	$z - 100$
3	$z - 100 + \frac{z - 100}{3} = \frac{4z - 400}{3}$
4	$\frac{4z - 400}{3} - 100 = \frac{4z - 700}{3}$
5	$\frac{4z - 700}{3} + \frac{4z - 700}{9} = \frac{16z - 2800}{9}$
6	$\frac{16z - 2800}{9} - 100 = \frac{16z - 3700}{9}$
7	$\frac{16z - 3700}{9} + \frac{16z - 3700}{27} = \frac{64z - 14800}{27}$
8	$\frac{64z - 14800}{27} = 2z$
9	$64z - 14800 = 54z$
10	$10z = 14800$
11	$z = 1480$

tion, under two different forms, from which no solution can be derived.

Example. 3. Two persons, A and B, were talking of their ages: says A to B, Seven years ago I was just three times as old as you were, and seven years hence I shall be just twice as old as you will be. I demand their present ages.

Let the ages of A and B be respectively	1	x and y
Seven years ago they were	2	$x - 7$ and $y - 7$
Seven years hence they will be	3	$x + 7$ and $y + 7$
Therefore by Quest. 1. and 2.	4	$x - 7 = 3 \times y - 7 = 3y - 21$
Also by Quest. 2. and 3.	5	$x + 7 = 2 \times y + 7 = 2y + 14$
By 4. and transp.	6	$x = 3y - 14$
By 5. and transp.	7	$x = 2y + 7$
By 6. and 7.	8	$3y - 14 = 2y + 7$
Transp. and 8.	9	$y = 21$
By 9. and 6. or 7.	10	$x = 49$

The ages of A and B then are 49 and 21, which answer the conditions.

The operation might have been a little shortened by subtracting the 4th from 5th, and thus $14 = -y + 35$; and thence $y = 21$. therefore (by 6th) $x = (39 - 14) = 49$.

Example. 4. A gentleman distributing money among some poor people, found he wanted 10s. to be able to give 5s. to each; therefore he gives each 4s. only, and finds he has 5s. left.—To find the number of shillings and poor people.

If any question such as this, in which there are two quantities sought, can be resolved by means of one letter, the solution is in general more simple than when two are employed. There must be, however, two independent conditions; one of which is used in the notation of one of the unknown quantities, and the other gives an equation.

Let the number of poor be z
The number of shillings will be $5z - 10$
The number of shillings is also $4z + 5$
By 2. and 3. $5z - 10 = 4z + 5$
Transp. $z = 15$.

The number of poor therefore is 15, and the number of shillings is $(4z + 5) = 65$, which answers the conditions.

Example. 5. A courier sets out from a certain place, and travels at the rate of 7 miles in 5 hours; and 8 hours after; another sets out from the same place, and travels the same road, at the rate of 5 miles in 3 hours: I demand how long and how far the first must travel before he is overtaken by the second?

Let the number of hours which the first travelled be y
Then the second travelled $y - 8$
The first travelled seven miles in 5 hours, and therefore in y hours $(5 : 7 :: y : \frac{7y}{5})$ miles
In like manner the second travelled in $y - 8$ hours $(3 : 5 :: y - 8 : \frac{5y - 40}{3})$ miles
But they both travelled the same number of miles; therefore by 3. and 4. $\frac{7y}{5} = \frac{5y - 40}{3}$
Mult. $21y - 200 = 25y$
Transp. $4y = 200$
Divid. $y = 50$

The first then travelled 50 hours, the second $(y - 8) = 42$ hours.

The miles travelled by each $(\frac{7y}{5} = \frac{5y - 40}{3}) = 70$.

Case III. When there are three or more unknown quantities.

Rule. When there are three unknown quantities, there must be three independent equations arising from the question; and from each of these a value of one of the unknown quantities must be obtained. By comparing these three values, two equations will arise, involving only two unknown quantities, which may therefore be resolved by the rule for Case 2.

In like manner may the rule be extended to such questions as contain four or more unknown quantities; and hence it may be inferred, That, when just as many

independent equations may be derived from a question as there are unknown quantities in it, these quantities may be found by the resolution of equations.

Example. 6. To find three numbers, so that the first, with half the other two, the second with one-third of the other two, and the third with one-fourth of the other two, may each be equal to 34.

Let the numbers be x, y, z , and the equations are

	1	$x + \frac{y+z}{2} = 34$
	2	$y + \frac{x+z}{3} = 34$
	3	$z + \frac{x+y}{4} = 34$
	4	$x = \frac{68 - y - z}{2}$
From the 1st	5	$x = 102 - 3y - z$
From the 2d	6	$x = 136 - 4z - y$
From the 3d	7	$\frac{68 - y - z}{2} = 102 - 3y - z$
From 4th and 5th	8	$y = \frac{136 - z}{5}$
7th reduced	9	$y = \frac{3z - 34}{2}$
5 = 6, and reduced	10	$\frac{3z - 34}{2} = \frac{136 - z}{5}$
8 and 9	11	$15z - 170 = 272 - 2z$
10th reduced	12	$17z = 442$ or $z = 26$
By 8 and 5	13	$y = 22$ and $x = 10$

Example. 7. To find a number consisting of three places, whose digits are in arithmetical proportion; if this number be divided by the sum of its digits, the quotient will be 48; and if from the number be subtracted 198, the digits will be inverted.

Let the 3 digits be	1	x, y, z
Then the number is	2	$100x + 10y + z$
If the digits be inverted, it is	3	$100z + 10y + x$
The digits are in ar. prop. therefore	4	$x + z = 2y$
By question	5	$\frac{100x + 10y + z}{x + y + z} = 48$
By question	6	$100x + 10y + z - 198 = 100z + 10y + x$
From 6 and transp.	7	$99x = 99z + 198$
Divid. by 99	8	$x = z + 2$
From 4	9	$x = 2y - z$
8 and 9	10	$2y - z = z + 2$
Transp.	11	$y = z + 1$
Mult. 5.	12	$100x + 10y + z = 48x + 48y + 48z$
Transp.	13	$52x = 38y + 47z$
8 and 11 substit. for x and y	14	$52z + 104 = 38z + 38 + 47z$
Transp.	15	$33z = 66$
Divid.	16	$z = 2$ $y = (z + 1) = 3$ $x = (z + 2) = 4$

The number then is 432, which succeeds upon trial.

Of Equations.

It sometimes happens, that all the unknown quantities, when there are more than two, are not in all the equations expressing the conditions, and therefore the preceding rule cannot be literally followed. The solution, however, will be obtained by such substitutions, which need not be particularly described.

Corollary to the preceding Rules.

It appears, that in every question there must be as many independent equations as unknown quantities; if there are not, then the question is called *indeterminate*, because it may admit of an infinite number of answers; since the equations wanting may be assumed at pleasure. There may be other circumstances, however, to limit the answers to one, or a precise number, and which, at the same time, cannot be directly expressed by equations. Such are these; that the numbers must be integers, squares, cubes, and many others. The solution of such problems, which are also called *diophantine*, shall be considered afterwards.

Scholium.

On many occasions, by particular contrivances, the operations by the preceding rules may be much abridged. This, however, must be left to the skill and practice of the learner. A few examples are the following.

1. It is often easy to employ fewer letters than there are unknown quantities, by expressing some of them from a simple relation to others contained in the conditions of the question. Thus the solution becomes more easy and elegant. (See Ex. 4. 5.)
2. Sometimes it is convenient to express by letters, not the unknown quantities themselves, but some other quantities connected with them, as their sum, difference, &c. from which they may be easily derived. (See Ex. 1. of chap. 5.)
3. In the operation, also, circumstances will suggest a more easy road than that pointed out by the general rules. Two of the original equations may be added together, or may be subtracted; sometimes they must be previously multiplied by some quantity, to render such addition or subtraction effectual, in exterminating one of the unknown quantities, or otherwise promoting the solution. Substitutions may be made of the values of quantities, in place of quantities themselves, and various other such contrivances may be used, which will render the solution much less complicated. (See Ex. 3. 7. and 9.)

SECT. II. General Solution of Problems.

In the solutions of the questions in the preceding

part, the given quantities (being numbers) disappear in the last conclusion, so that no general rules for like cases can be deduced from them. But if letters are used to denote the known quantities, as well as the unknown, a general solution may be obtained, because, during the whole course of the operation, they retain their original form. Hence also the connection of the quantities will appear in such a manner as to discover the necessary limitations of the data, when there are any, which is necessary to the perfect solution of a problem. From this method, too, it is easy to derive a synthetical demonstration of the solution.

When letters, or any other such symbols, are employed to express all the quantities, the algebra is sometimes called *specious* or *literal*.

Examp. 8. To find two numbers, of which the sum and difference are given.

Let s be the sum given, and d the given difference. Also, let x and y be the two numbers sought.

$$x + y = s$$

$$x - y = d$$

$$\text{Whence } \begin{cases} x = s - y \\ x = d + y \end{cases}$$

$$d + y = s - y$$

$$2y = s - d$$

$$y = \frac{s - d}{2}$$

$$\text{And } x = \frac{s + d}{2}$$

Thus, let the given sum be 100, and the difference 24.

$$\text{Then } x = \left(\frac{s + d}{2} = \frac{124}{2} = 62 \right) \text{ and } y = \left(\frac{s - d}{2} = \frac{76}{2} = 38 \right).$$

In the same manner may the canon be applied to any other values of s and d . By reversing the steps in

the operation, it is easy to show, that if $x = \frac{s + d}{2}$ and $y = \frac{s - d}{2}$, the sum of x and y must be s , and their difference d .

Examp. 9 If A and B together can perform a piece of work in the time a , A and C together in the time b , and B and C together in the time c , in what time will each of them perform it alone?

Let A perform the work in the time x , B in y , and C in z ; then as the work is the same in all cases, it may be represented by unity.

3 F 2

By

ALGEBRA.

If particular values be inserted for these letters, a particular solution will be obtained for that case. Let them denote the numbers in Example 5.

$$\text{Then } x = \left(\frac{qra}{qr-ps} = \frac{5 \times 5 \times 8}{5 \times 5 - 7 \times 3} = \frac{200}{4} = 50. \right)$$

Here it is obvious, that qr must be greater than ps , else the problem is impossible; for then the value of x would either be infinite or negative. This limitation appears also from the nature of the question, as the second courier must travel at a greater rate than the first, in order to overtake him. For the rate of the first courier is to the rate of the second as $\frac{p}{q}$ to $\frac{r}{s}$, that is, as ps to qr ; and therefore qr must be greater than ps .

Scholium.

Sometimes when there are many known quantities in a general solution, it may simplify the operation to express certain combinations of them by new letters, still to be considered as known.

CHAP. IV.

Of Involution and Evolution.

In order to resolve equations of the higher orders, it is necessary to premise the rules of *Involution* and *Evolution*.

LEMMA.

The reciprocals of the powers of a quantity may be expressed by that quantity, with negative exponents of the same denomination. That is, the series $a, 1, \frac{1}{a}, \frac{1}{a^2}, \frac{1}{a^3}, \frac{1}{a^m}$, &c. may be expressed by $a^1, a^0, a^{-1}, a^{-2}, a^{-3}, a^{-m}$, &c.

For the rule for dividing the powers of the same root was to subtract the exponents; if then the index of the divisor be greater than that of the dividend, the index of the quotient must be negative.

$$\text{Thus, } \frac{a^2}{a^3} = a^2 - a^3 = a^{-1}. \text{ Also, } \frac{a^2}{a^3} = \frac{1}{a^1}.$$

$$\frac{a^m}{a^m} = a^m - m = a^0. \text{ Also, } \frac{a^m}{a^m} = 1. \text{ and so on of others.}$$

Cor. 1. Hence any quantity which multiplies either the numerator or denominator of a fraction, may be transposed from the one to the other, by changing the sign of its index.

$$\text{Thus, } \frac{x}{y^2} = xy^{-2}. \text{ And } \frac{a^2x}{y^3} = \frac{a^2}{y^3x^{-1}}, \text{ \&c.}$$

Cor. 2. From this notation, it is evident that these negative powers, as they are called, are multiplied by adding, and divided by subtracting their exponents.

$$\text{Thus, } a^{-2} \times a^{-3} = a^{-5}.$$

$$\text{Or, } \frac{1}{a^2} \times \frac{1}{a^3} = \frac{1}{a^5} = a^{-5}.$$

$$\frac{a^{-1}}{a^{-3}} = a^2. \text{ Or, } \frac{1}{a^3} \div \frac{1}{a^4} = a^2.$$

By the question

$$\begin{aligned} 1 \quad (x:1::a:) \frac{a}{x} &= A \text{ in } a \text{ days} \\ 2 \quad (y:1::a:) \frac{a}{y} &= B \text{ in } a \text{ days} \\ 3 \quad (x:1::b:) \frac{b}{x} &= A \text{ in } b \text{ days} \\ 4 \quad (z:1::b:) \frac{b}{z} &= C \text{ in } b \text{ days} \\ 5 \quad (y:1::c:) \frac{c}{y} &= B \text{ in } c \text{ days} \\ 6 \quad (z:1::c:) \frac{c}{z} &= C \text{ in } c \text{ days} \end{aligned}$$

to the work performed by

$$\begin{aligned} 7 \quad \frac{a}{x} + \frac{a}{y} &= 1 \text{ and } ay + ax = xy \\ 8 \quad \frac{b}{x} + \frac{b}{z} &= 1 \text{ and } bz + bx = xz \\ 9 \quad \frac{c}{y} + \frac{c}{z} &= 1 \text{ and } cz + cy = zy \end{aligned}$$

Mult. 7th by $\frac{bc}{xy}$ 10 $\frac{abc}{x} + \frac{abc}{y} = bc$

Mult. 8th by $\frac{ac}{xz}$ 11 $\frac{abc}{x} + \frac{abc}{z} = ac$

Mult. 9th by $\frac{ab}{zy}$ 12 $\frac{abc}{y} + \frac{abc}{z} = ab$

Add 10th, 11th, 12th, 13 $\frac{2abc}{x} + \frac{2abc}{y} + \frac{2abc}{z} = bc + ac + ab$

From 13th subt. twice 10th 14 $\frac{2abc}{z} = ac + ab - bc, \text{ \& } z = \frac{2abc}{ac + ab - bc}$

From 13th subt. twice 11th 15 $\frac{2abc}{y} = bc + ab - ac, \text{ \& } y = \frac{2abc}{bc + ab - ac}$

From 13th subt. twice 12th 16 $\frac{2abc}{x} = bc + ac - ab, \text{ \& } x = \frac{2abc}{bc + ac - ab}$

Example in numbers. Let $a=8$ days, $b=9$ days, and $c=10$; then $x=14\frac{34}{49}$, $y=17\frac{23}{41}$, and $z=23\frac{7}{31}$.

It appears likewise that a, b, c , must be such, that the product of any two of them must be less than the sum of these two multiplied by the third. This is necessary to give positive values of x, y , and z , which alone can take place in this question. Besides, if x, y , and z , be assumed as any known numbers whatever, and if values of a, b , and c , be deduced from steps 7th, 8th, and 9th, of the preceding operation, it will appear, that a, b , and c , will have the property required in the limitation here mentioned.

If a, b , and c , were such, that any of the quantities x, y , or z , became equal to 0, it implies that one of the agents did nothing in the work. If the values of any of these quantities be negative, the only supposition which could give them any meaning would be, that some of the agents, instead of promoting the work, either obstructed it, or undid it to a certain extent.

Examp. 10. In question 5th, let the first courier travel p miles in q hours; the second r miles in s hours; let the interval between their setting out be a ;

Then, by working as formerly,

$$x = \frac{qra}{qr-ps}$$

I. Of Involution.

To find any power of any quantity is the business of involution.

Case 1. When the quantity is simple.

Rule. Multiply the exponents of the letters by the index of the power required, and raise the coefficient to the same power.

Thus, the second power of a is $a^1 \times 2 = a^2$.

The 3d power of $2a^2$ is $8a^2 \times 3 = 8a^6$.

The 3d power of $3ab^3$ is $27a^3 \times 3b^3 \times 3 = 27a^3b^9$.

For the multiplication would be performed by the continual addition of the exponents; and this multiplication of them is equivalent. The same rule holds also when the signs of the exponents are negative.

Rule for the signs. If the sign of the given quantity is $+$, all its powers must be positive. If the sign is $-$, then all its powers whose exponents are even numbers are positive; and all its powers whose exponents are odd numbers are negative.

This is obvious from the rule for the signs in multiplication.

The last part of it implies the most extensive use of the signs $+$ and $-$, by supposing that a negative quantity may exist by itself.

Case 2. When the quantity is compound.

Rule. The powers must be found by a continual multiplication of it by itself.

Thus, the square of $x + \frac{a}{2}$ is found by multiplying it into itself. The product is $x^2 + ax + \frac{a^2}{4}$. The cube of $x + \frac{a}{2}$ is got by multiplying the square already found by the root, &c.

Fractions are raised to any power, by raising both numerator and denominator to that power, as is evident from the rule for multiplying fractions in Chap. I. § 2.

The involution of compound quantities is rendered much easier by the binomial theorem; for which see Chap. VI.

Note. The square of a binomial consists of the squares of the two parts, and twice the product of the two parts.

II. Of Evolution.

Evolution is the reverse of involution, and by it powers are resolved into their roots.

Def. The root of any quantity is expressed by placing before it $\sqrt{\quad}$ (called a *radical sign*) with a small figure above it, denoting the denomination of that root.

Thus, the square root of a is $\sqrt[2]{a}$ or $\sqrt{a}$.

The cube root of bc is $\sqrt[3]{bc}$.

The 4th root of $a^2b - x^3$, is $\sqrt[4]{a^2b - x^3}$.

The m th root of $c^2 - dx$ is $\sqrt[m]{c^2 - dx}$.

General Rule for the Signs.

1. The root of any positive power may be either positive or negative, if it is denominated by an even number; if the root is denominated by an odd number, it is positive only.
2. If the power is negative, the root also is negative, when it is denominated by an odd number.
3. If the power is negative, and the denomination of the root even, then no root can be assigned.

This rule is easily deduced from that given in involution, and supposes the same extensive use of the signs $+$ and $-$. If it is applied to abstract quantities in which a contrariety cannot be supposed, any root of a positive quantity must be positive only; and any root of a negative quantity, like itself, is unintelligible.

In the last case, though no root can be assigned, yet sometimes it is convenient to set the radical sign before the negative quantity, and then it is called an *impossible* or *imaginary* root.

The root of a positive power, denominated by an even number, has often the sign $\pm$ before it, denoting that it may have either $+$ or $-$.

The radical sign may be employed to express any root of any quantity whatever; but sometimes the root may be accurately found by the following rules; and when it cannot, it may often be more conveniently expressed by the methods now to be explained.

Case I. When the quantity is simple.

Rule. Divide the exponents of the letters by the index of the root required, and prefix the root of the numeral coefficient.

1. The exponents of the letters may be multiples of the index of the root, and the root of the coefficient may be extracted.

Thus, the square root of $a^4 = a^{\frac{4}{2}} = \pm a^2$

$$\sqrt[3]{27a^6} = 3a^{\frac{6}{3}} = 3a^2$$

$$\sqrt[4]{a^4b^{12}} = a^{\frac{4}{4}}b^{\frac{12}{4}} = \pm ab^3$$

2. The exponents of the letters may not be multiples of the index of the root, and then they become fractions; and when the root of the coefficient cannot be extracted, it may also be expressed by a fractional exponent, its original index being understood to be 1.

Thus, $\sqrt{16a^3b^2} = 4a^{\frac{3}{2}}b$

$$\sqrt[3]{7ax^3} = 7^{\frac{1}{3}}a^{\frac{1}{3}}x = \sqrt[3]{7} \times a^{\frac{1}{3}}x$$

As evolution is the reverse of involution, the reason of the rule is evident.

The root of any fraction is found by extracting that root out of both numerator and denominator.

Case II. When the quantity is compound.

1. To extract the square root.

Rule. 1. The given quantity is to be ranged according to the powers of the letters, as in division.

Thus,

Of Involution and Evolution.

Thus, in the example $a^3 + 2ab + b^3$, the quantities are ranged in this manner.

2. The square root is to be extracted out of the first term (by preceding rules), which gives the first part of the root sought. Subtract its square from the given quantity, and divide the first term of the remainder by double the part already found, and the quotient is the second term of the root.

Thus, in this example, the remainder is $2ab + b^3$; and $2ab$ being divided by $2a$, the double of the part found, gives $+b$ for the second part of the root.

3. Add this second part to double of the first, and multiply their sum by the second part: Subtract the product from the last remainder, and if nothing remain, the square root is obtained. But if there is a remainder, it must be divided by the double of the parts already found, and the quotient will give the third part of the root; and so on.

In the last example, it is obvious that $a+b$ is the square root sought.

The entire operation is as follows.

$$\begin{array}{r}
 a^3 + 2ab + b^3 \quad (a+b) \\
 \underline{a^2} \\
 2a + b \\
 \times b \\
 \hline
 2ab + b^2 \\
 \hline
 * \\
 x^4 - ax^2 + \frac{a^2}{4} \left(x^2 - \frac{a}{2} \right) \\
 \underline{x^4} \phantom{- ax^2 + \frac{a^2}{4} \left(x^2 - \frac{a}{2} \right)} \\
 2x^2 - \frac{a}{2} \\
 \times -\frac{a}{2} \\
 \hline
 -ax^2 + \frac{a^2}{4} \\
 \hline
 -ax + \frac{a^2}{4} \\
 \hline
 *
 \end{array}$$

The reason of this rule appears from the composition of a square.

2. To extract any other root.

Rule. Range the quantity according to the dimensions of its letters, and extract the said root out of the first term, and that shall be the first member of the root required. Then raise this root to a dimension lower by unit than the number that denominates the root required, and multiply the power that arises by that number itself. Divide the second term of the given quantity by the product, and the quotient shall give the second member of the root required.—In like manner are the other parts to be found, by considering those already got as making one term.

Thus, the fifth root of

$$\begin{array}{r}
 a^5 + 5a^4b + 10a^3b^2 + 10a^2b^3 + 5ab^4 + b^5 \quad (a+b) \\
 \underline{a^5} \\
 5a^4
 \end{array}$$

And $a+b$ raised to the 5th power is the given quantity, and therefore it is the root sought.

In evolution it will often happen, that the operation will not terminate, and the root will be expressed by a series.

Thus, the square root of $a^2 + x^2$ becomes a series.

$$\begin{array}{r}
 a^2 + x^2 \left(a + \frac{x^2}{2a} - \frac{x^4}{8a^3} + \frac{x^6}{16a^5}, \&c. \right) \\
 \underline{a^2} \\
 2a + \frac{x^2}{2a} \\
 \times \frac{x^2}{2a} \\
 \hline
 x^2 + \frac{x^4}{4a^2} \\
 \hline
 2a + \frac{x^2}{a} - \frac{x^4}{8a^3} \\
 \times -\frac{x^4}{8a^3} \\
 \hline
 -\frac{x^4}{4a^2} - \frac{x^6}{8a^4} + \frac{x^8}{64a^6} \\
 \hline
 * + \frac{x^6}{8a^4} - \frac{x^8}{64a^6}, \&c.
 \end{array}$$

The extraction of roots by series is much facilitated by the binomial theorem (Chap. vi. Sect. 3.) By similar rules, founded on the same principles, are the roots of numbers to be extracted.

III. Of Surds.

Def. Quantities with fractional exponents are called *surds*, or *imperfect powers*.

Such quantities are also called *irrational*; in opposition to others with integral exponents, which are called *rational*.

Surds may be expressed either by the fractional exponents, or by the radical sign, the denominator of the fraction being its index; and hence the orders of surds are denominated from this index.

In the following operations, however, it is generally convenient to use the notation by the fractional exponents.

$$a^{\frac{1}{2}} = \sqrt[2]{a}, \sqrt[4]{4ab^2} = 2ba^{\frac{1}{2}}, \sqrt[4]{a^3b^2} = a^{\frac{3}{4}}b^{\frac{1}{2}}.$$

The operations concerning surds depend on the following principle: If the numerator and denominator of a fractional exponent be both multiplied or both divided by the same quantity, the value of the power is

the same. Thus $a^{\frac{m}{n}} = a^{\frac{mc}{nc}}$: for let $a^{\frac{m}{n}} = b$; then $a^m = b^n$, and $a^{mc} = b^{nc}$, and extracting the root nc , $a^{\frac{mc}{nc}} = b^{\frac{nc}{nc}} = b = a^{\frac{m}{n}}$.

Lem. A rational quantity may be put into the form of a surd, by reducing its index to the form of a fraction of the same value.

$$\begin{array}{l}
 \text{Thus, } a = a^{\frac{2}{2}} = \sqrt{a^2} \\
 a^2b = a^{\frac{6}{3}}b^{\frac{1}{3}} = \sqrt[3]{a^6b}
 \end{array}$$

PROB. I. To reduce surds of different denominators to others of the same value and of the same denomination.

Rule.

Part. I.

A L G E B R A.

Of Invol-
ution and
Evolution.

Rule. Reduce the fractional exponents to others of the same value and having the same common denominator.

Ex. $\sqrt{a}$, $\sqrt[3]{b^2}$ or $a^{\frac{1}{2}}$, $b^{\frac{2}{3}}$
but $a^{\frac{1}{2}} = a^{\frac{3}{6}}$ and $b^{\frac{2}{3}} = b^{\frac{4}{6}}$.

therefore $\sqrt{a}$, and $\sqrt[3]{b^2}$ are respectively equal to $\sqrt[6]{a^3}$ and $\sqrt[6]{b^4}$.

PROB. II. To multiply and divide surds.

1. When they are surds of the same rational quantity, add and subtract their exponents.

Thus, $a^{\frac{1}{2}} \times a^{\frac{1}{2}} = a^{\frac{1}{2} + \frac{1}{2}} = a^1 = a$
 $\sqrt{a^2 - b^2} \times \sqrt{a^2 - b^2} = (a^2 - b^2)^{\frac{1}{2} + \frac{1}{2}} = a^2 - b^2$
 $\sqrt[3]{a^2 - b^2} \times \sqrt[3]{a^2 - b^2} = (a^2 - b^2)^{\frac{1}{3} + \frac{1}{3}} = (a^2 - b^2)^{\frac{2}{3}} = \sqrt[3]{(a^2 - b^2)^2}$

2. If they are surds of different rational quantities, let them be brought to others of the same denomination, if already they are not, by prob. 1. Then, by multiplying or dividing these rational quantities, their product or quotient may be set under the common radical sign.

Thus, $\sqrt[m]{a} \times \sqrt[n]{b} = \sqrt[mn]{a^n b^m} = \sqrt[mn]{a^n b^m}$
 $\sqrt{a^2 - b^2} \times \sqrt{a^2 - b^2} = \sqrt{(a^2 - b^2)(a^2 - b^2)} = \sqrt{a^4 - 2a^2b^2 + b^4}$
 $\sqrt[4]{a^3 b^2} \times \sqrt[4]{a^3 b^2} = \sqrt[4]{a^6 b^4} = \sqrt[4]{a^4 a^2 b^4} = \sqrt[4]{a^4} \sqrt[4]{a^2 b^4} = a \sqrt[4]{a^2 b^4} = a \sqrt[4]{a^2} \sqrt[4]{b^4} = a \sqrt[4]{a^2} b$
 $\sqrt[3]{a^2 b} \div \sqrt[3]{a^2 b} = a^{\frac{2}{3} - \frac{2}{3}} b^{\frac{1}{3} - \frac{1}{3}} = a^0 b^0 = 1$
 $a^{\frac{1}{2}} b^{\frac{1}{2}} = \sqrt{ab}$

If the surds have any rational coefficients, their product or quotient must be prefixed. Thus, $a\sqrt{m} \times b\sqrt{n} = ab\sqrt{mn}$. It is often convenient, in the operations of this problem, not to bring the surds of simple quantities to the same denomination, but to express their product or quotient without the radical signs, in the same manner as if they were rational quantities. Thus, the product in Ex. 1. may be $a^{\frac{1}{2}} b^{\frac{1}{2}}$, and the quotient in Ex. 3. $a^{\frac{1}{2}} b^{\frac{1}{2}}$.

Cor. If a rational coefficient be prefixed to a radical sign, it may be reduced to the form of a surd by the lemma, and multiply by this problem; and conversely, if the quantity under the radical sign be divisible by a perfect power of the same denomination, it may be taken out, and its root prefixed as a coefficient.

$a\sqrt{b} = \sqrt{a^2 b}$; $2\sqrt[3]{a} = \sqrt[3]{8a}$.

Conv. $\sqrt{a^2 b^3} = ab\sqrt{b}$; $\sqrt{4a^2 - 8a^2 b} = 2a\sqrt{1 - 2b}$.

Even when the quantity under the radical sign is not divisible by a perfect power, it may be useful sometimes to divide surds into their component factors, by reversing the operation of this problem.

Thus $\sqrt{ab} = \sqrt{a} \times \sqrt{b}$, $\sqrt[3]{a^2 b - bx^2} = \sqrt[3]{ba - bx}$
 $\sqrt[3]{a+x} \times \sqrt[3]{a-x} = \sqrt[3]{a^2 - x^2}$

PROB. III. To involve or evolve Surds.

This is performed by the same rules as in other quantities, by multiplying or dividing their exponents by the index of the power or root required.

The notation by negative exponents, mentioned in the lemma at the beginning of this chapter, is applicable to fractional exponents, in the same manner as to integers.

Scholium.

This application of the rules of this chapter to the resolving of equations, shall be explained in the succeeding chapters, which treat of the solution of the different classes of them; but some examples of their use in preparing equations for a solution are the following.

If a member of an equation be a surd root, then the equation may be freed from any surd, by bringing that member first to stand alone upon one side of the equation, and then taking away the radical sign from it, and raising the other side to the power denominated by the index of that surd.

This operation becomes a necessary step towards the solution of an equation, when any of the unknown quantities are under the radical sign.

Example. If $3\sqrt{x^2 - a^2} + 2y = a + y$
Then $3\sqrt{x^2 - a^2} = a - y$
and $9 \times x^2 - a^2 = a^2 - 2ay + y^2$.

If the unknown quantity be found only under the radical sign, and only of the first dimension, the equation will become simple, and may be resolved by the preceding rules.

Thus, if $3\sqrt{4x + 16} + 5 = 9$

Then $3\sqrt{4x + 16} = 4$

And $4x + 16 = \frac{16}{9}$

$4x = \frac{16}{9} - 16$

And $x = \frac{4}{9} - 4$

If $\sqrt[m]{a^2 x - b^2 x} = a$
Then $a^2 x - b^2 x = a^m$

$x = \frac{a^m}{a^2 - b^2}$

If the unknown quantity in a final equation has fractional exponents, by means of the preceding rules a new equation may be substituted, in which the exponents of the unknown quantity are integers.

Thus, if $x^{\frac{1}{2}} + 3x^{\frac{2}{3}} = 10$, by reducing the surds to the same denomination, it becomes $x^{\frac{3}{6}} + 3x^{\frac{4}{6}} = 10$; and if $z = x^{\frac{1}{6}}$, then $z^3 + 3z^4 = 10$; and if this equation be resolved from a value of z , a value of x may be got by the rules of the next chapter. Thus also, if $x + 2x^{\frac{1}{2}} - 3x^{\frac{1}{3}} = 100$. If $x^{\frac{1}{6}} = z$, this equation becomes $z^6 + 2z^3 - 3z^2 = 100$.

In general, if $x^{\frac{p}{q}} + x^{\frac{m}{n}} = a$, by reducing the surds to the same denomination: $x^{\frac{pn}{nq}} + x^{\frac{qm}{qn}} = a$, and if $x^{\frac{1}{qn}} = z$, then the equation is $z^{pn} + z^{qm} = a$, in which the

Of Invol-
ution and
Evolution.

Equations. the exponents of z are integers; and z being found, x is to be found from the equation $x^{\frac{1}{qn}} = z$.

A L G E B R A.

CHAP. V.

EQUATIONS were divided into orders according to the highest index of the unknown quantity in any term. (chap. 3.)

Equations are either *pure* or *adfect*ed.

Def. 1. A *pure equation* is that in which only one power of the unknown quantity is found.

2. An *adfect*ed equation, is that in which different powers of the unknown quantity are found in the several terms.

Thus, $a^2 + ax^2 = b^3$, $ax^2 - b^2 = m^2 + x^2$ are pure equations.

An $x^2 - ax = b^2$, $x^3 + x^2 = 17$, are adfect

1. Solution of pure Equations.

Rule. Make the power of the unknown quantity to stand alone by the rules formerly given, and then extract the root of the same denomination out of both sides, which will give the value of the unknown quantity.

EXAMPLES.

$$\text{If } a^2 + ax^2 = b^3 \\ ax^2 = b^3 - a^2$$

$$ax^m - b = x^m - c \\ ax^m - x^m = b - c$$

Then by Ex. 8. chap. 3.

The proportionals are

Mult. by 2 and still

From the three first

From the three last

3d added to 4th

4th subtr. from 3d

6th reduced

7th subst. for x in 5th

Transp. and divide 8th by $\frac{2}{b}$

In numbers

$$1 \quad \frac{a+z}{2} : \frac{b+y}{2} : \frac{b-y}{2} : \frac{a-z}{2}$$

$$2 \quad a+2 : b+y : b-y : a-z$$

$$3 \quad ab-ay+bz-zy = b^2+2by+y^2$$

$$4 \quad ab+ay-bz-zy = b^2-2by+y^2$$

$$5 \quad 2ab-2zy = 2b^2+2y^2$$

$$6 \quad 2bz-2ay = 4by$$

$$7 \quad z = \frac{2by+ay}{b}$$

$$8 \quad 2ab-2 \times \frac{2by^2+ay^2}{b} = 2b^2+2y^2$$

$$9 \quad ab^2-b^3 = 3by^2+ay^2$$

$$10 \quad \frac{ab^2-b^3}{3b+a} = y^2 \text{ and } y = \sqrt{\frac{ab^2-b^3}{3b+a}}$$

$$11 \quad y = \sqrt{\frac{ab^2-b^3}{3b+a}} = b \sqrt{\frac{a-b}{3b+a}} = 24 \sqrt{\frac{32}{128}} = 12$$

$$12 \quad z = \frac{2b+a}{b} \times y = 52$$

Hence the four proportionals are 54, 18, 6, 2; and it appears that b must not be greater than a , otherwise the root becomes impossible, and the problem would also be impossible; which limitation might be deduced also from prop. 25. V. of Euclid.

2 Solution of adfect

Adfect

And adfect

N^o 11.

The index of the power may also be fractional; as in the last example m may be any number whatever. Let $m = \frac{1}{2}$, then as before,

$$x^m = x^{\frac{1}{2}} = \frac{b-c}{a-1}$$

$$\text{And } x = \frac{b-c}{a-1}^2 = \frac{b^2-2bc+c^2}{a^2-2a+1}$$

Sometimes different powers of the unknown quantity are found in the equation, yet the several terms may form on one side a perfect power, of which the root being extracted, the equation will become simple.

Thus, if $x^3 - 12x^2 + 48x = 98$, it is easy to observe that $x^3 - 12x^2 + 48x - 64 = 34$; forming a complete cube; of which the root being extracted, $x-4 = \sqrt[3]{34}$. And $x = 4 + \sqrt[3]{34}$.

Example 1. To find four continued proportionals, of which the sum of the extremes is 56, and the sum of the means 24.

To resolve the question in general terms, let the sum of the extremes be a , the sum of the means b , and let the difference of the extremes be called z , and the difference of the means y .

Rule. 1. Transpose all the terms involving the unknown quantity to one side, and the known terms to the other; and so that the term containing the square of the unknown quantity may be positive.

2. If the square of the unknown quantity is multiplied by any coefficient, all the terms of the equation are to be divided by it, so that the coefficient of the square of the known quantity may be 1.

3. Add to both sides the square of half the coefficient of the unknown quantity itself, and the side of the equation involving the unknown quantity will be a complete square.

3

4. Extract

Equations. 4. Extract the square root from both sides of the equation, by which it becomes simple, and by transposing the above mentioned half coefficient, a value of the unknown quantity is obtained in known terms, and therefore the equation is resolved.

The reason of this rule is manifest from the composition of the square of a binomial, for it consists of the squares of the two parts, and twice the product of the two parts. *Note*, at the end of Chap. IV.

The different forms of quadratic equations, expressed in general terms, being reduced by the first and second parts of the rule, are these;

1. $x^2 + ax = b^2$
2. $x^2 - ax = b^2$
3. $x^2 - ax = -b^2$

Case 1. $x^2 + ax = b^2$

$$x^2 + ax + \frac{a^2}{4} = b^2 + \frac{a^2}{4}$$

$$x + \frac{a}{2} = \pm \sqrt{b^2 + \frac{a^2}{4}}$$

$$x = \pm \sqrt{b^2 + \frac{a^2}{4}} - \frac{a}{2}$$

Case 2. $x^2 - ax = b^2$

$$x^2 - ax + \frac{a^2}{4} = b^2 + \frac{a^2}{4}$$

$$x - \frac{a}{2} = \pm \sqrt{b^2 + \frac{a^2}{4}}$$

$$x = \frac{a}{2} \pm \sqrt{b^2 + \frac{a^2}{4}}$$

Case 3. $x^2 - ax = -b^2$

$$x^2 - ax + \frac{a^2}{4} = \frac{a^2}{4} - b^2$$

$$x - \frac{a}{2} = \pm \sqrt{\frac{a^2}{4} - b^2}$$

$$x = \frac{a}{2} \pm \sqrt{\frac{a^2}{4} - b^2}$$

Of these cases it may be observed,

1. That if it be supposed, that the square root of a positive quantity may be either positive or negative, according to the most extensive use of the signs, every quadratic equation will have two roots, except such of the third form, whose roots become impossible.

2. It is obvious, that, in the two first forms, one of the roots must be positive, and the other negative.

3. In the third form, if $\frac{a^2}{4}$, or the square of half of the coefficient of the unknown quantity, be greater than b^2 , the known quantity, the two roots will be positive. If $\frac{a^2}{4}$ be equal to b^2 , the two roots then become equal.

But if in this third case $\frac{a^2}{4}$ is less than b^2 , the quantity under the radical sign becomes negative, and the two roots are therefore impossible. This may be easily shown to arise from an impossible supposition in the original equation.

4. If the equation, however, express the relation of magnitudes abstractly considered, where a contrariety cannot be supposed to take place, the negative roots cannot be of use, or rather there are no such roots;

VOL. I. Part II.

Equations. for then a negative quantity by itself is unintelligible, and therefore the square root of a positive quantity must be positive only. Hence, in the two first cases, there will be only one root; but in the third, there will be two. For in this third case, $x^2 - ax = -b^2$, or $ax - x^2 = b^2$, it is obvious that, x may be either greater or less than $\frac{1}{2}a$, and yet $a - x$ may be positive; and hence $a - x \times x = ax - x^2$ may also be positive, and may be equal to a given positive quantity b^2 : therefore the square root of $x^2 - ax + \frac{1}{4}a^2$ may be either $x - \frac{1}{2}a$ or $\frac{1}{2}a - x$, and both these quantities also positive.

Let then $x - \frac{a}{2} = \sqrt{\frac{a^2}{4} - b^2}$ and $x = \frac{a}{2} + \sqrt{\frac{a^2}{4} - b^2}$. Also let $\frac{a}{2} - x = \sqrt{\frac{a^2}{4} - b^2}$; and hence $x = \frac{a}{2} - \sqrt{\frac{a^2}{4} - b^2}$, and these are the same two positive roots as were obtained by the general rule.

The general rule is usually employed, even in questions where negative numbers cannot take place, and then the negative roots of the two first forms are neglected. Sometimes even only one of the positive roots of the third case can be used, and the other may be excluded by a particular condition in the question. When an impossible root arises in the solution of a question, and if it be resolved in general terms, the necessary limitation of the data will be discovered.

When a question can be so stated as to produce a pure equation, it is generally to be preferred to an affected. Thus the question in the preceding section, by the most obvious notation, would produce an affected equation.

2. Solution of Questions producing Quadratic Equations.

The expression of the conditions of the question by equations, or the stating of it, and the reduction likewise of these equations, till we arrive at a quadratic equation, involving only one unknown quantity and its square, are effected by the same rules which were given for the solution of simple equations in Chap. III.

Examp. 2. One lays out a certain sum of money in goods, which he sold again for L. 24. and gained as much per cent. as the goods cost him: I demand what they cost him?

If the money laid out be	1	y
The gain will be	2	$24 - y$
But this gain is	3	$\frac{2400 - 100y}{y}$ per cent.
($y:24-y::100$)		
Therefore by question	4	$y = \frac{2400 - 100y}{y}$
And by mult. and tr.	5	$y^2 + 100y = 2400$
Completing the square	6	$y^2 + 100y + 50^2 = 2400 + 2500$ $= 4900$
Extr. the root	7	$y + 50 = \pm \sqrt{4900} = 70$
Transp.	8	$y = \pm 70 - 50 = 20 \text{ or } -120.$

The answer is 20l. which succeeds. The other root, -120, has no place in this example, a negative number being here unintelligible.

Any quadratic equation may be resolved also by the general canons at the beginning of this section. That arising

Equations. arising from this question, (No. 5.) belongs to Case I. and $a=100$, $b^2=2400$; therefore,

$$y = \left(-\frac{a \pm \sqrt{\frac{a^2}{4} + b^2}}{2} \right) - \frac{100 \pm \sqrt{\frac{100^2}{4} + 2400}}{2} = 20, \text{ or } -120 \text{ as before.}$$

Examp. 3. What two numbers are those, whose difference is 15, and half of whose product is equal to the cube of the lesser?

Let the lesser number be	1	x
The greater is	2	$x+15$
By question	3	$\frac{x^2+15x}{2} = x^3$
Divide by x and mult. by 2	4	$x+15 = 2x^2$
4th prepared	5	$x^2 - \frac{x}{2} = \frac{15}{2}$
Complete square	6	$x^2 - \frac{x}{2} + \frac{1}{16} = \frac{15}{2} + \frac{1}{16} = \frac{121}{16}$
Ext. $\sqrt{\quad}$	7	$x - \frac{1}{4} = \pm \frac{11}{4}$
Transp.	8	$x = 3 \text{ or } -\frac{5}{2}$

The numbers therefore are 3 and 18, which answer the conditions. This is an example of Case 2d, and the negative root is neglected.

A solution, indeed, may be represented by means of the negative root $-\frac{5}{2}$; for then the other number is

$(x+15) = -\frac{5}{2} + 15 = \frac{25}{2}$. And $\frac{1}{2} \times \frac{25}{2} \times -\frac{5}{2}$, is equal to the cube of $-\frac{5}{2}$. Such a solution, though useless, and even absurd, it is plain must correspond to the conditions, if those rules with regard to the signs be used in the application of it, by which it was itself deduced. The same observation may be extended even to impossible roots; which being assumed as the answer of a question, must, by reversing the steps of the investigation, correspond to the original equations, by which the conditions of that question were expressed.

Examp. 4. To find two numbers whose sum is 100, and whose product is 2059.

Let the given sum $100=a$, the product $2059=b$, and let one of the numbers sought be x , the other will be $a-x$. Their product is $ax-x^2$.

Therefore by question	1	$ax-x^2=b$ or $x^2-ax=-b$
Complete the square	2	$x^2-ax+\frac{a^2}{4}=\frac{a^2}{4}-b$
Ext. $\sqrt{\quad}$	3	$x-\frac{a}{2}=\pm\sqrt{\frac{a^2}{4}-b}$
Transp.	4	$x=\frac{a}{2}\pm\sqrt{\frac{a^2}{4}-b}$
And the other number	5	$a-x=\frac{a}{2}\pm\sqrt{\frac{a^2}{4}-b}$

By inserting numbers, $x=71$ or 29 and $a-x=29$ or 71 , so that the two numbers sought are 71 and 29.

Here it is to be observed, that b must not be greater than $\frac{a^2}{4}$, else the roots of the equation would be impossible; that is, the given product must not be greater than the square of half the given sum of the numbers sought. This limitation can easily be shown from other principles; for the greatest possible product of two parts into which any number may be divided, is when each of them is a half of it. If b be equal to $\frac{a^2}{4}$, there is only one solution, and $x=\frac{a}{2}$, also $a-x=\frac{a}{2}$.

Examp. 5. There are three numbers in continual geometrical proportion: The sum of the first and second is 10, and the difference of the second and third is 24. What are the numbers?

Let the first be	1	z
The second will be	2	$10-z$
And the third	3	$34-z$
Since $z:10-z::10-z:34-z$	4	$z^2-20z+100=34z-z^2$
Transp.	5	$2z^2-54z=-100$
Divid.	6	$z^2-27z=-50$
Compl. the square	7	$z^2-27z+\frac{27^2}{4}=\frac{27^2}{4}-50=\frac{529}{4}$
Extract the $\sqrt{\quad}$	8	$z-\frac{27}{2}=\pm\sqrt{\frac{529}{4}}=\pm\frac{23}{2}$
Transp.	9	$z=\frac{27}{2}\pm\frac{23}{2}=25 \text{ or } 2.$

But though there are two positive roots in this equation, yet only one of them can here be of use, the other being excluded by a condition in the question. For as the sum of the first and second is 10, 25 cannot be one of them: 2 therefore is the first, and the proportionals will be 2, 8, 32.

This restriction will also appear from the explanation given of the third form, to which this equation belongs. For z may be less than $\frac{27}{2}$, but from the

first condition of the question it cannot be greater; hence the quantity $z^2-27z+\frac{27^2}{4}$ can have only one square root, viz. $\frac{27}{2}-z$; and this being put equal to

$$\sqrt{\frac{529}{4}}, \text{ we have by transposition } z=\frac{27}{2}-\frac{23}{2}=2,$$

which gives the only just solution of the question.

From the other root, indeed, a solution of the question may be represented by means of a negative quantity. If the first then be 25, the three proportionals will be 25, -15, 9. These also must answer the conditions, according to the rules given for negative quantities, though such a solution has no proper meaning.

Besides, it is to be observed, that if the following question be proposed, 'To find three numbers in geometrical proportion, so that the difference of the 1st and

Equations. and 2d may be 10, and the sum of the 2d and 3d may be 24, the equation in step 6th will be produced; for if the 1st be z , the second is $z-10$, and the 3d $34-z$, and therefore $34z-z^2=z^2-20z+100$, the very same equation as in step 4th. In this question it is plain that the root 25 only can be useful, and the three proportionals are 25, 15, 9.

But the necessary limitations of such a problem are properly to be derived from a general notation. Let the sum of the two first proportionals be a , and the difference of the two last b . If a is not greater than b , the first term must be the least; but if a be greater than b , the first term may be either the greatest or the least.

When the first term is the least, the proper notation of the three terms is z , $a-z$, $a+b-z$, and the equation when ordered is $z^2-\frac{3a+b}{2}z=\frac{a^2}{2}$. If the first term be the greatest, and then a is greater than b , the notation of the terms is z , $a-z$, $a-b-z$, and the corresponding equation is $z^2-\frac{3a-b}{2}z=\frac{a^2}{2}$.

Of the first of these equations it may be observed, that whatever be the value of a and b , the square of $\frac{3a+b}{4}$, viz. of half the coefficient of z , is greater than $\frac{a^2}{2}$, and therefore the roots are always possible. If the square be completed, and the roots extracted, they become $z-\frac{3a+b}{4}=\frac{\sqrt{3a+b}^2-8a^2}}{4}$, and $\frac{3a+b}{4}-z=\frac{\sqrt{3a+b}^2-8a^2}}{4}$. But in this case z is the least of the three terms, and therefore a is greater than $2z$, or $\frac{a}{2}$ is greater than z ; much more then is $\frac{3a+b}{4}$ greater than z ; and therefore the second root only can be admitted, and $z=\frac{3a+b-\sqrt{3a+b}^2-8a^2}}{4}$ is the only proper solution.

In the second equation, since a is greater than b , $\frac{3a-b}{2}$ must be always positive, and therefore the equation is necessarily of the third form. But the roots are possible only when $\left|\frac{3a-b}{4}\right|^2$ is not less than $\frac{a^2}{2}$, that is, when a^2+b^2 is not less than $6ab$, or when $a-b$ is not less than $2\sqrt{ab}$. When the roots are possible, z may be either greater or less than $\frac{3a-b}{4}$, and hence each root gives a proper solution; therefore, $z=\frac{3a-b\pm\sqrt{3a-b}^2-8a^2}}{4}$.

Ex. Let $a=40$ and $b=6$. The first term in this case may be assumed either as the greatest or the least. And, first, if z be the greatest, the roots of the equation will be possible, since $(a^2+b^2)=1636$ is greater than $(6ab)=1440$. The two values of z are 32 and 25, and the proportionals are either 32, 8, 2, or 25, 15, 9. 2dly, If z be assumed the least of the propor-

Equations. tionals, the two roots of the equation are possible, but one of them only can be applied; which is 17.635 nearly; and the three proportionals are 17.635, 22.365, and 28.365, nearly, the roots of the equation being incommensurate.

In like manner may the limitations of the other question above mentioned be ascertained.

Though the preceding questions have been so contrived that the answers may be integers, yet in practice it will most commonly happen that they must be surds. When in any question the root of a number which is not a perfect square is to be extracted, it may be continued in decimals, by the common arithmetical rule, to any degree of accuracy which the nature of the subject may require.

Scholium.

An equation, in the terms of which two powers only of the unknown quantity are found, and such that the index of the one is double that of the other, may, by the preceding rules, be reduced to a pure equation, and may therefore be resolved by § 1. of this chapter.

Such an equation may generally be represented thus:

$$x^{2m}\pm ax^m=\pm b^n$$

Let $x^m=z$, then $z^2\pm az=\pm b^n$

$$\text{And } x^m(=z)=\pm\frac{a}{2}\pm\sqrt{\frac{a^2}{4}\pm b^n}$$

$$\text{Therefore } x^m=\sqrt{\pm\frac{a}{2}\pm\sqrt{\frac{a^2}{4}\pm b^n}}$$

Examp. 1. To find two numbers, of which the product is 100, and the difference of their square root 3.

Let the less be x ,
the greater is

By question

1	$\frac{100}{x}$
2	$\frac{10}{\sqrt{x}}-\sqrt{x}=3$
3	$10-x=3\sqrt{x}=3x^{\frac{1}{2}}$
4	$x+3x^{\frac{1}{2}}=10$
5	$x+3x^{\frac{1}{2}}+\frac{9}{4}=10+\frac{9}{4}=\frac{49}{4}$
6	$x^{\frac{1}{2}}+\frac{3}{2}=\pm\frac{7}{2}$ and $x^{\frac{1}{2}}=2$ or -5
7	$x=4$ or $x=25$.

If $x=4$, the other number is 25; and this is the proper solution, for x was supposed to be the least. In this case, indeed, the negative root of the equation being applied according to the rules for negative quantities, gives a positive answer to the question; and if $x=25$, the other number is 4.

The same would have been got, by substituting in the general theorem $m=\frac{1}{2}$, $a=3$, and $b^n=10$; or if the less number had been called $x^{\frac{1}{2}}$, the equation would not have had fractional exponents.

CHAP. VI.

Of Indeterminate Problems.

It was formerly observed (Chap. III.), that if there are more unknown quantities in a question than equations,

Indetermi-
nate Pro-
blems.

tions by which their relations are expressed, it is indetermined; or it may admit of an infinite number of answers. Other circumstances, however, may limit the number in a certain manner; and these are various, according to the nature of the problem. The contrivances by which such problems are resolved are so very different in different cases, that they cannot be comprehended in general rules.

Examp. 1. To divide a given square number into two parts, each of which shall be a square number.

There are two quantities sought in this question, and there is only one equation expressing their relation; but it is required also that they may be rational, which circumstance cannot be expressed by an equation: another condition therefore must be assumed, in such a manner as to obtain a solution in rational numbers.

Let the given square be a^2 ; let one of the squares sought be x^2 , the other is $a^2 - x^2$. Let $rx - a$ also be a side of the last square, therefore

$$\begin{aligned} r^2 x^2 - 2rxa + a^2 &= a^2 - x^2 \\ r^2 x^2 + x^2 &= 2rxa \\ r^2 x + x &= 2ra \\ x &= \frac{2ra}{r^2 + 1} \end{aligned}$$

By transp.
Divide by x

Therefore

$$\text{And } rx - a = \frac{2ra}{r^2 + 1} - a = \frac{r^2 - 1}{r^2 + 1} a.$$

Let r therefore be assumed at pleasure, and $\frac{2ra}{r^2 + 1}$, $\frac{r^2 - 1}{r^2 + 1} a$, which must always be rational, will be the sides of the two squares required.

Thus, if $a^2 = 100$; then if $r = 3$, the sides of the two squares are 6 and 8, for $36 + 64 = 100$.

Also let $a^2 = 64$. Then if $r = 2$, the sides of the squares are $\frac{32}{5}$ and $\frac{24}{5}$; and $\frac{1024}{25} + \frac{576}{25} = \frac{1600}{25} = 64$.

The reason of the assumption of $rx - a$ as a side of the square $a^2 - x^2$, is, that being squared and put equal to this last, the equation manifestly will be simple, and the root of such an equation is always rational.

Examp. 2. To find two square numbers whose difference is given.

Let x^2 and y^2 be the square numbers, and a their difference.

$$\text{Put } \frac{z+v}{2} = x, \text{ and } \frac{z-v}{2} = y$$

$$\frac{z^2 + 2zv + v^2}{4} = x^2$$

$$\frac{z^2 - 2zv + v^2}{4} = y^2$$

$$zv = x^2 - y^2 = a.$$

If x and y are required only to be rational, then take v at pleasure, and $z = \frac{a}{v}$, whence x and y are known.

But if x and y are required to be whole numbers, take for z and v any two factors that produce a , and are both even or both odd numbers. And this is possible only where a is either an odd number greater than

1, or a number divisible by 4. Then $\frac{z+v}{2}$ and $\frac{z-v}{2}$ are the numbers sought.

For the product of two odd numbers is odd, and that of two even numbers is divisible by 4. Also, if z and v are both odd or both even, $\frac{z+v}{2}$ and $\frac{z-v}{2}$ must be integers.

Ex. 1. If $a = 27$, take $v = 1$, then $z = 27$; and the squares are 196 and 169. Or z may be 9 and $v = 3$, and then the squares are 36 and 9.

2. If $a = 12$, take $v = 2$, and $z = 6$; and the squares are 16 and 4.

Examp. 3. To find a sum of money in pounds and shillings, whose half is just its reverse.

Note. The reverse of a sum of money, as 8l. 12s. is 12l. 8s.

Let x be the pounds and y the shillings.

The sum required is $20x + y$

Its reverse is $20y + x$

$$\text{Therefore } \frac{20x + y}{2} = 20y + x$$

$$20x + y = 40y + 2x$$

$$18x = 39y$$

$$x : y :: (39 : 18 ::) 13 : 6$$

In this equation there are two unknown quantities; and, in general, any two numbers of which the proportion is that of 13 to 6 will agree to it.

But, from the nature of this question, 13 and 6 are the only two that can give the proper answer, viz. 13l. 6s. for its reverse 6l. 13s. is just its half.

The ratio of x and y is expressed in the lowest integral terms by 13 and 6; any other expression of it, as the next greater 26 and 12, will not satisfy the problem, as 12l. 26s. is not a proper notation of money in pounds and shillings.

CHAP. VII.

Demonstration of Theorems by Algebra.

ALGEBRA may be employed for the demonstration of theorems, with regard to all those quantities concerning which it may be used as an analysis; and from the general method of notation and reasoning, it possesses the same advantages in the one as in the other. The three first sections of this chapter contain some of the most simple properties of series which are of frequent use; and the last, miscellaneous examples of the properties of algebraical quantities and numbers.

1. Of Arithmetical Series.

Def. When a number of quantities increase or decrease by the same common difference, they form an arithmetical series.

Thus, $a, a+b, a+2b, a+3b, \&c. x, x-b, x-2b, \&c.$

Also, 1, 2, 3, 4, 5, 6, &c. and 8, 6, 4, 2, &c.

Prop. In an arithmetical series, the sum of the first and

Demon-
stration of
Theorems.

and last terms is equal to the sum of any two intermediate terms, equally distant from the extremes.

Let the first term be a , the last x , and b the common difference; then $a+b$ will be the second, and $x-b$ the last but one, &c.

Thus, $a, a+b, a+2b, a+3b, a+4b, \&c.$
 $x, x-b, x-2b, x-3b, x-4b, \&c.$

It is plain, that the terms in the same perpendicular rank are equally distant from the extremes; and that the sum of any two in it is $a+x$, the sum of the first and last.

Cor. 1. Hence the sum of all the terms of an arithmetical series is equal to the sum of the first and last, taken half as often as there are terms.

Therefore if n be the number of terms, and s the sum of the series; $s = a + x \times \frac{n}{2}$. If $a = 0$, then $s = \frac{nx}{2}$.

Cor. 2. The same notation being understood, since any term in the series consists of a , the first term, together with b taken as often as the number of terms preceding it, it follows, that $x = a + n-1 \times b$, and hence $s = 2a + n-1 \times b \times \frac{n}{2}$; or by multiplication, $s = \frac{2an + n^2b - nb}{2}$. Therefore from the first term, the common difference, and number of terms being given, the sum may be found.

Ex. Required the sum of 50 terms of the series 2, 4, 6, 8, &c.

$$s = \frac{2 \times 2 \times 50 + 50^2 \times 2 - 50 \times 2}{2} = \frac{5100}{2} = 2550.$$

Cor. 3. Of the first term, common difference, sum and number of terms, any three being given, the fourth may be found by resolving the preceding equation; a, b, s , and n , being successively considered as the unknown quantity. In the three first cases the equation is simple, and in the last it is quadratic.

II. Of Geometrical Series.

Def. When a number of quantities increase by the same multiplier, or decrease by the same divisor, they form a geometrical series. This common multiplier or divisor is called the *common ratio*.

Thus, $a, ar, ar^2, \&c. a, \frac{a}{r}, \frac{a}{r^2}, \frac{a}{r^3}, \&c.$
 $1, 2, 4, 8, \&c.$

Prop. I. The product of the extremes in a geometrical series is equal to the product of any two terms, equally distant from the extremes.

Let a be the first term, y the last, r the common ratio: then the series is,

$a, ar, ar^2, ar^3, ar^4, \&c.$

$y, \frac{y}{r}, \frac{y}{r^2}, \frac{y}{r^3}, \frac{y}{r^4}, \&c.$

It is obvious, that any term in the upper rank is equally distant from the beginning as that below it

from the end; and the product of any two such is equal to ar , the product of the first and last.

Prop. II. The sum of a geometrical series wanting the first term, is equal to the sum of all but the last term multiplied by the common ratio.

For, assuming the preceding notation of a series, it is plain that

$$ar + ar^2 + ar^3, \&c. \dots + \frac{y}{r^3} + \frac{y}{r^2} + \frac{y}{r} + y =$$

$$= r \times a + ar + ar^2, \&c. \dots + \frac{y}{r^4} + \frac{y}{r^3} + \frac{y}{r^2} + \frac{y}{r}$$

Cor. 1. Therefore s being the sum of the series,

$$s - y \times r = s - a. \text{ And } s = \frac{yr - a}{r - 1}$$

Hence s can be found from a, y , and r ; and any three of the four being given, the fourth may be found.

Cor. 2. Since the exponent of r in any term is equal to the number of terms preceding it; hence in the last term its exponent will be $n-1$; the last term, therefore, $y = ar^{n-1}$, and $s = \frac{r^n - a}{r - 1} = a \times \frac{r^n - 1}{r - 1}$. Hence of these four, s, a, r, n , any three being given, the fourth may be found by the solution of equations. If n is not a small number, the cases of this problem will be most conveniently solved by logarithms; and of such solutions there are examples in the appendix to this part.

Cor. 3. If the series decreases, and the number of terms is infinite, then, according to this notation, a the least term will be 0, and $s = \frac{yr}{r - 1}$ a finite sum.

Ex. Required the sum of the series $1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \&c.$ to infinity.

Here $y = 1$, and $r = 2$. Therefore $s = \frac{1 \times 2}{2 - 1} = 2$.

What are called in arithmetic *repeating* and *circulating decimals*, are truly geometrical decreasing serieses, and therefore may be summed by this rule.

Thus $.333, \&c. = \frac{3}{10} + \frac{3}{100} +, \&c.$ is a geometrical series in which $y = \frac{3}{10}$ and $r = 10$; therefore $s = \frac{yr}{r - 1} + \frac{3 \times 10}{10 \times 10 - 1} = \frac{1}{3}$.

Thus also $.2424, \&c. = \frac{24}{100}$, for here $y = \frac{24}{100}$ and $r = 100$; therefore $s = \frac{24 \times 100}{100 \times 100 - 1} = \frac{24}{99} = \frac{8}{33}$.

III. Of Infinite Series.

It was observed (Chap. I. and IV.), that in many cases, if the division and evolution of compound quantities be actually performed, the quotients and roots can only be expressed by a series of terms, which may be continued *ad infinitum*. By comparing a few of the first terms, the law of the progression of such a series

Demon-
stration of
Theorems.

ries will frequently be discovered, by which it may be continued without any farther operation. When this cannot be done, the work is much facilitated by several methods; the chief of which is that by the binomial theorem.

THEOREM. Any binomial (as $a+b$) may be raised to any power (m) by the following rules.

1. From inspecting a table of the powers of a binomial obtained by multiplication, it appears that the terms without their coefficients are a^m , $a^{m-1}b$, $a^{m-2}b^2$, $a^{m-3}b^3$, &c.

2. The coefficients of these terms will be found by the following rule.

Divide the exponent of a in any term by the exponent of b increased by 1, and the quotient multiplied by the coefficient of that term will give the coefficient of the next following term.

This rule is found, upon trial in the table of powers, to hold universally. The coefficient of the first terms is always 1; and by applying the general rule now proposed, the coefficients of the terms in order will be as follows: 1, m , $m \times \frac{m-1}{2}$, $m \times \frac{m-1}{2} \times \frac{m-2}{3}$, &c. They

may be more conveniently expressed thus: 1, $A m$, $B \times \frac{m-1}{2}$, $C \times \frac{m-2}{3}$, $D \times \frac{m-3}{4}$, &c. the capitals denoting the preceding coefficient. Hence $(a+b)^m = a^m + A m a^{m-1} b + B \times \frac{m-1}{2} a^{m-2} b^2 + C \times \frac{m-2}{3} a^{m-3} b^3$, &c. This is the celebrated binomial theorem. It is deduced here by induction only; but it may be rigidly demonstrated, though upon principles which do not belong to this place.

Cor. 1. As m may denote any number, integral or fractional, positive or negative; hence the division, involution, and evolution, of a binomial, may be performed by this theorem.

Ex. 1. Let $m = \frac{1}{2}$, then $(a+b)^{\frac{1}{2}} = a^{\frac{1}{2}} + \frac{1}{2} a^{-\frac{1}{2}} b + \frac{1}{8} a^{-\frac{3}{2}} b^2 + \frac{1}{16} a^{-\frac{5}{2}} b^3$, &c. This being applied to the extraction of the square root of $a^2 + x^2$ (by inserting a^2 for a and x^2 for b), the same series results as formerly (Chap. IV.)

Ex. 2. If $\frac{1}{1-r}$ is to be turned into an infinite series, since $\frac{1}{1-r} = 1 \times (1-r)^{-1}$, let $a=1$, $b=-r$, and $m=-1$; and the same series will arise as was obtained by division (Chap. I.)

In like manner $\frac{r^2}{\sqrt{2rz-z^2}} (= r^2 \times (2rz-z^2)^{-\frac{1}{2}})$ may be expressed by an infinite series, by supposing $a=2rz$, $b=-z^2$, and $m=-\frac{1}{2}$, and then multiplying that series by r^2 .

Cor. 2. This theorem is useful also in discovering the law of an infinite series produced by division or evolution. Thus, the series expressing the square root

$a^2 + x^2$, consists of a , together with a series of fractions; in the numerators of which are the even powers of x , and in the denominators the odd powers of a . The numeral coefficients of the terms of the whole series, as deduced by the theorem, will be 1, $+\frac{1}{2 \times 1}$, $-\frac{1 \times 1}{2 \cdot 2 \times 1 \cdot 2}$, $+\frac{1 \times 1 \cdot 3}{2 \cdot 2 \cdot 2 \times 1 \cdot 2 \cdot 3}$, $-\frac{1 \times 1 \cdot 3 \cdot 5}{2 \cdot 2 \cdot 2 \cdot 2 \times 1 \cdot 2 \cdot 3 \cdot 4}$, &c.

the point being used (as it often is) to express the product of the numbers between which it is placed. The law of continuation is obvious; and the series may be carried on to any number of terms, without using the theorem. Hence also the coefficient of the n th term is $\frac{1 \times 1 \cdot 3 \cdot 5 \dots (n-2 \text{ terms})}{2^{n-1} \times 1 \cdot 2 \cdot 3 \cdot 4 \dots (n-1)}$; and it is $+$ if n is an even number, and $-$ if n is odd.

Note. If the binomial is $a+b$, the signs of the terms of any power are all positive; if it is $a-b$, the alternate terms are negative, beginning at the second. This theorem may be applied to quantities which consist of more than two parts, by supposing them distinguished into two, and then substituting for the powers of these compound parts their values, to be obtained also, if required, from the theorem. Thus, $(a+b+c)^2 = a^2 + b^2 + c^2$.

Scholium.

An infinite series may itself be multiplied or divided by another; it may be involved or evolved; and various other operations may be performed upon it which are necessary in the higher parts of algebra. The methods for finding the sum depend upon other principles.

IV. Properties of Numbers.

THEOR. I. The sum of two quantities multiplied by their difference is equal to the difference of their squares.

Let the quantities be represented by a and b , then $a+b \times a-b = a^2 - b^2$, as appears by performing the operation.

Cor. If a and b be any two quantities of which the sum may be denoted by s , the difference by d , and their product by p , then the following propositions will be true.

- | | |
|-------------------------------------|-------------------------------------|
| 1. $a^2 + b^2 = s^2 - 2p$ | 2. $a^2 - b^2 = sd$ |
| 3. $a^3 + b^3 = s^3 - 3ps$ | 4. $a^3 - b^3 = s^3 d - dp$ |
| 5. $a^4 + b^4 = s^4 - 4ps^2 + 2p^2$ | 6. $a^4 - b^4 = s^3 d - 2sdp$, &c. |

It is unnecessary to express these propositions in words, and the demonstrations are very easy, by raising $a+b$ to certain powers, and making proper substitutions.

THEOR. II. The sum of any number of terms (n) of the odd numbers 1, 3, 5, &c. beginning with 1, is equal to the square of that number (n).

In the rule for summing an arithmetical series, let $a=1$, $b=2$, and $n=n$, and the sum of this series will be $s = \frac{2an + n^2 b - nb}{2} = \frac{2n^2}{2} = n^2$. Q.E.D.

THEOR.

Demon-
stration of
Theorems.

THEOR. III. *The difference of any two square numbers is equal to the sum of the two roots, together with twice the sum of the numbers in the natural scale between the two roots.*

Let the one number be p , and the other $p+n$, the intermediate numbers are $p+1, p+2, \dots$ &c. $p+n-1$. The difference of the squares of the given numbers is $2pn+n^2$; the sum of the two roots is $2p+n$, and twice the sum of the series $p+1+p+2 \dots$ &c. $p+n-1$ is (by Cor. 1. 1st Sect. of this Chap.) $2s=2p+n \times n-1$, viz. the sum of the first and last multiplied by the number of terms, and it is plain that $2p+n+2p+n \times n-1=2pn+n^2$. Therefore, &c.

Lem. 1. Let r be any number, and n any integer, r^n-1 is divisible by $r-1$.

The quotient will be $r^{n-1}+r^{n-2}, \dots$ &c. till the index of r be 0, and then the last term of it will be 1; for if this series be multiplied by the divisor $r-1$, it will produce the dividend r^n-1 . It will appear also by performing the division, and inserting for n any number.

Lem. 2. Let r be any number, and n any integer odd number, r^n+1 is divisible by $r+1$. Also, if n is any even number, r^n-1 is divisible by $r+1$.

The quotient in both cases is $r^{n-1}-r^{n-2}+r^{n-3} \dots$ &c. till the exponent of r be 0, and the last term $r^0=1$. If this series consist of an odd number of terms, and be multiplied by $r+1$ the divisor, the product is r^n+1 the dividend. If the series consist of an even number of terms, the product is r^n-1 ; but it is plain that the number of terms will be odd only when n is odd, and even only when n is even. The conclusion will be manifest by performing the division.

Lem. 3. If r is the root of an arithmetical scale, any number in that scale may be represented in the following manner, $a, b, c, \dots$ being the coefficients or digits, $a+br+cr^2+dr^3+er^4, \dots$

THEOR. IV. *If from any number in the general scale now described, the sum of its digits be subtracted, the remainder is divisible by $r-1$.*

The number is $a+br+cr^2+dr^3, \dots$ and the sum of the digits is $a+b+c+d, \dots$. Subtracting the latter from the former, the remainder is $br-b+cr^2-c+dr^3-d, \dots = b \times r-1+c \times r^2-1+d \times r^3-1, \dots$. But (by Lem. 1.) r^n-1 is divisible by $r-1$, whatever integer number n may be, and therefore any multiple of r^n-1 is also divisible by $r-1$: Hence each of the terms, $b \times r-1, c \times r^2-1, \dots$ is divisible by $r-1$, and therefore the whole is divisible by $r-1$.

Cor. 1. Any number, the sum of whose digits is divisible by $r-1$, is itself divisible by $r-1$. Let the number be called N , and the sum of the digits D ; then by this prop. $N-D$ is divisible by $r-1$, and D is supposed to be divisible by $r-1$; therefore it is plain that N must also be divisible by $r-1$.

Cor. 2. Any number, the sum of whose digits is divisible by an aliquot part of $r-1$, is also divisible by that aliquot part. For, let N and D denote as before; and since $N-D$ (Theor. 4.) is divisible by $r-1$, it is also divisible by an aliquot part of $r-1$; but D is divisible by an aliquot part of $r-1$, therefore N is also divisible by that aliquot part.

Cor. 3. This theorem, with the corollaries, relates to any scale whatever. It includes therefore the well known property of 9 and of 3 its aliquot part, in the decimal scale; for, since $r=10, r-1=9$.

THEOR. V. *In any number, if from the sum of the coefficients of the odd powers of r the sum of the coefficients of the even powers be subtracted, and the remainder added to the number itself, the sum will be divisible by $r+1$.*

In the number $a+br+cr^2+dr^3+er^4+fr^5, \dots$ the sum of the coefficients of the odd powers of r is $b+f, \dots$ &c. the sum of the coefficients of the even powers of r is $a+c+e, \dots$ &c. If the latter sum be subtracted from the former, and the remainder added to the given number, it makes $br+b+cr^2-c+dr^3+d+er^4-e+fr^5+f, \dots = b \times r+1+c \times r^2-1+d \times r^3+1+e \times r^4-1+f \times r^5+1, \dots$. But (by Lem. 2) $r+1, r^2-1, r^3+1, \dots$ &c. are each divisible by $r+1$, and therefore any multiples of them are also divisible by $r+1$, hence the whole number is divisible by $r+1$.

Cor. 1. If the difference of the sum of the even digits, and the sum of the odd digits of any number be divisible by $r+1$, the number itself is divisible by $r+1$.

Let the sum of the even digits (that is, the coefficients of the odd powers of r) be D , the sum of the odd digits be d , and let the number be N . Then by the theorem $N+D-d$ is divisible by $r+1$, and it is supposed that $D-d$ is divisible by $r+1$; therefore N is divisible by $r+1$.

Cor. 2. In like manner, if $D-d$ is divisible by an aliquot part of $r+1$, N will be divisible by that aliquot part.

Cor. 3. If a number want all the odd powers of r , or if it wants all the even powers of r , and if the sum of its digits be divisible by $r+1$, that number is divisible by $r+1$.

Cor. 4. In the common scale $r+1=11$, which therefore will have the properties mentioned in this theorem, and the corollaries. Thus, in the number 64,834, the sum of the even digits is 7, the sum of the odd digits is 18, and the difference is 11, a number divisible by 11, the given number therefore (Cor. 1.) is divisible by 11. Thus also, the sum of the digits of 7040308 is divisible by 11, and therefore the number is divisible by 11. (Cor. 3.)

Scholium.

These theorems relate to any scale whatever, and therefore the properties of $r-1$ in Theor. 4. would in a scale of eight belong to seven, and those in Theor. 5. to nine. If twelve was the root of the scale, the former properties would belong to eleven, and the latter to thirteen.

APPENDIX to PART I.

ALGEBRA may be employed in expressing the relations of magnitude in general, and in reasoning with regard to them. It may be used in deducing not only the relations of number, but also those of extension, and hence those of every species of quantity expressible by numbers or extended magnitudes. In this appendix are mentioned some examples of its application to other parts of mathematics, to physics, and to the

the practical calculations of business. The principles and suppositions peculiar to these subjects, which are necessary in directing both the algebraical operations and the conclusions to be drawn from them, are here assumed as just and proper.

I. Application of Algebra to Geometry.

Algebra has been successfully applied to almost every branch of mathematics; and the principles of these branches are often advantageously introduced into algebraical calculations.

The application of it to *geometry* has been the source of great improvement in both these sciences; on account of its extent and importance it is here omitted, and the principles of it are more particularly explained in the third part of these elements.

In this place shall be given an example of the use of logarithms in resolving certain algebraical questions.

Note. When logarithms are used, let (*l.*) denote the logarithm of any quantity before which it is placed.

Ex. To find the number of terms of a geometrical series, of which the sum is 511, the first term 1, and the common ratio 2.

From sect. 2 chap. 6. it appears that $s = \frac{ar^n - a}{r - 1}$, and in this problem, *s*, *r*, and *a* are given, and *n* is to be found. By reducing the equation $r^n = \frac{s \times r - a}{a}$ and from the known property of logarithms $n \times l.r = l.s \times r - 1 + a - l.a$, and $n = \frac{l.s \times r - 1 + a - l.a}{l.r}$. But

here $s = 511$, $a = 1$, $r = 2$, and $n = \frac{l.512}{l.2} =$

$$\frac{2.7092700}{0.3010300} = 9.$$

In like manner may any such equation be resolved, when the only unknown quantity is an exponent, and when it is the exponent only of one quantity.

Ex. 2. An equation of the following quadratic form $a^x \pm 2ba^x = \pm c$ may be resolved by logarithms. If, by scholium of Chap. V. $a^x = \pm b \pm \sqrt{b^2 \pm c}$. And then *x* is discovered in the same manner as in the preceding example. Thus, let $a = 2$, $b = 10$, and $c = 96$ and the equation $2^x - 20 \times 2^x = -96$. If, $2^x = 10 \pm$

$\sqrt{4} = 12$ or 8. If $2^x = 8$, then $x = \frac{l.8}{l.2} = 3$ and $2^6 -$

$20 \times 2^3 = -96$ is a true equation. If $2^x = 12$, then

$$x = \frac{l.12}{l.2} = \frac{1.0791812}{0.3010300} = 3.5849, \text{ and this number being}$$

inserted for *x* in the given equation, by means of logarithms, will answer the conditions.

Ex. 3. The sums of 2000l. has been out at interest for a certain time, and 500l. has been at interest double of that time, the whole arrear now due, reckoning 4 per cent. compound interest, is 6000l. What were the times?

By the rules in the third part of this appendix for compound interest, it is plain that if $R = 1.04$, and the time at which the 2000l. is at interest be *x*, the arrear of it will be $2000 \times R^x$. The arrear of the 500l. is $500 \times R^{2x}$; hence $500 \times R^{2x} + 2000 \times R^x = 6000$. This

N^o 11.

resolved gives $R^x = 2$ and $x = \frac{l.2}{l.R} = 17.67$, + nearly, that is, 17 years and 8 months nearly; and the double is 35 years and 4 months; which answer the conditions.

II. Application of Algebra to Physics.

Physical quantities which can be divided into parts, that have proportions to each other the same as the proportions of lines to lines, or of numbers to numbers, may be expressed by lines and numbers, and therefore by algebraical quantities. Hence these mathematical notations may be considered as the measures of such physical quantities; they may be reasoned upon according to the principles of algebra, and from such reasonings, new relations of the quantities which they represent may be discovered.

In those branches of natural philosophy, therefore, in which the circumstances of the phenomena can be properly expressed by numbers, or geometrical magnitudes, algebra may be employed, both in promoting the investigation of physical laws by experience, and also in deducing the necessary consequences of laws investigated and presumed to be just.

It is to be observed likewise, that if various hypotheses be assumed concerning physical quantities, without regard to what takes place in nature, their consequences may be demonstratively deduced, and thus a science may be established, which may be properly called *mathematical*. The use of algebra in this science, which is sometimes called *Theoretical Mechanics*, is obvious from the principles already laid down.

In conducting these inquiries, it is to be observed, that, for the sake of brevity, the language of algebraical operations is often used with regard to physical quantities themselves; though it is always to be understood, that, in strict propriety, it can be applied only to the mathematical notations of these quantities.

Before illustrating this application of algebra by examples, it may be proper to explain a method of stating the proportion of variable quantities, and reasoning with regard to it, which is of general use in natural philosophy.

1. Of the Proportion of variable Quantities.

Mathematical quantities are often so connected, that when the magnitude of one is varied, the magnitudes of the others are varied, according to a determined rule. Thus, if two straight lines, given in position, intersect each other; and, if a straight line, cutting both, moves parallel to itself, the two segments of the given lines between their intersection and the moving line, however varied, will always have the same proportion. Thus also, if an ordinate to the diameter of a parabola move parallel to itself, the absciss will be increased or diminished in proportion as the square of the ordinate is increased or diminished.

In like manner may algebraical quantities be connected. If *x*, *y*, *z*, &c. represent any variable quantities, while *a*, *b*, *c*, represent such as are constant or invariable, then an equation containing two or more variable quantities, with any number of constant quantities, will exhibit a relation of variable quantities, similar to those already mentioned. Thus, if $ax = by$, then $x : y :: b : a$, that is, *x* has a constant proportion to *y*, in

Of Equations. in whatever way these two quantities may be varied.

Likewise, if $xy^2 = a^2b$, then $y^2 : a^2 :: b : x$, or $y^2 : \frac{1}{x} :: a^2 : \frac{1}{b}$, that is, y^2 has a constant proportion to the reciprocal of x , or y^2 is increased in the same proportion as x is diminished, and conversely. It is necessary to premise the following definitions.

Definitions.

Let there be any number of variable quantities, X, Y, Z, V , &c. connected in such a manner, that when X becomes x, Y, Z, V , &c. become respectively y, z, v , &c. And let a, b, c , &c. represent any constant quantities, whether given or unknown. Then,

1. If two variable quantities X and Y are so connected, that whatever be the values of x and $y, X : x :: Y : y$, this proportion is expressed thus, $X = Y$, and X is said to be *directly as* Y , or shortly, X is said to be *as* Y .

2. If two variable quantities X and Y are so connected, that $X : x :: \frac{1}{Y} : \frac{1}{y}$, their relation is thus expressed, $X = \frac{1}{Y}$; and X is said to be *inversely*, or *reciprocally as* Y .

3. If X, Y, Z , are three variable quantities, so connected that $X : x :: YZ : yz$, their relation is so expressed, $X = YZ$, and X is said to be *directly as* Y and Z *jointly*; or X is said to be *as* Y and Z .

4. If any number of variable quantities as X, Y, Z, V , &c. are so connected, that $XY : xy :: \frac{YZ}{V} : \frac{yz}{v}$; then $XY = \frac{YZ}{V}$, and XY is said to be *directly as* YZ ,

and *inversely as* V , or more explicitly, X and Y *jointly*, are *directly as* Y and Z *jointly*, and *inversely as* V .

In like manner are other combinations of variable quantities denoted and expressed.

It is to be observed also, the same definitions take place, when the variable quantities are multiplied or divided by any constant quantities. Thus, if $aX : ax :: \frac{b}{Y} : \frac{b}{y}$ then $aX = \frac{b}{Y}$, &c.

5. Let the preceding notation of proportion be called a *proportional equation* (A), the equations formerly treated of being in this place, for the sake of distinction, called *absolute*.

Cor. Every absolute equation, containing more than one variable quantity, may be considered as a proportional equation; and in a proportional equation, if at any particular corresponding values of the variable quantities, the equation becomes absolute, it will be universally absolute.

Prop. 1. If one side of a proportional equation be either multiplied or divided by any constant quantity, it will continue to be true. Thus, if $X = \frac{1}{Y}$, then

VOL. I. Part II.

$X = \frac{a^2}{bY}$. For since $X = \frac{1}{Y}$ (Def. 3.) $X : x :: \frac{1}{Y} : \frac{1}{y}$, it follows, (Chap. II.) that $X : x :: \frac{a^2}{bY} : \frac{a^2}{by}$, therefore

(Def. 4.) $X = \frac{a^2}{bY}$.

Prop. 2. If the two sides of a proportional equation be both multiplied, or both divided by the same quantity, it will continue to be true.

1st, If the quantity be constant, it is manifest from

Prop. 1.

2d, If the quantity be variable, let $X = Y$, and Z a variable quantity, then $XZ = YZ$. For, since $X = Y$, (Def. 2.) $X : x :: Y : y$; multiply the antecedents by Z , and the consequents by z , then $XZ : xz :: YZ : yz$, therefore (Def. 5.) $XZ = YZ$. In like manner, if $X = Y, \frac{X}{Z} = \frac{Y}{Z}$.

Cor. Any variable quantity, which is a factor of one side of a proportional equation, may be made to stand alone. Thus, if $XY = \frac{Z}{V}$, then $X = \frac{Z}{YV}$; also, $Z = XYV$; and $Y = \frac{Z}{XV}$, and also $V = \frac{Z}{XY}$, &c. Hence, also, if one side of a proportional equation be divided by the other, the quotient is a constant quantity, viz. 1.

Prop. 3. If two proportional equations have a common side, the remaining two sides will form a proportional equation. Also, that common side will be as the sum or difference of the other two.

Thus, if $X = Y$, and $Y = Z$, then $X = Z$. For $X : x :: Y : y$, and $Y : y :: Z : z$, therefore multiplying these ratios, $XY : xy :: YZ : yz$, and by dividing antecedents and consequents, $X : x :: Z : z$, therefore (Def. 1.) $X = Z$.

Likewise, if $X = Y$, and $Y = Z$, $Y = X \pm Z$. For, since $X : x :: Y : y :: Z : z$. (Chap. II.) $Y : y :: X \pm Z : x \pm z$, therefore Def. 5. $Y = X \pm Z$.

Cor. Hence, one side of a proportional equation will be as the sum, or as the difference of the two sides; and the sum of the two sides will be as their difference. Thus, if $X = Y + Z$, then $X = X + Y + Z$ and $X = X - Y - Z$, and also $X + Y + Z = X - Y - Z$.

Prop. 4. If the two sides of a proportional equation be respectively multiplied or divided by the two sides of any other proportional equation, the products or quotients will form a proportional equation.

Thus, if $X = Y$, and $Z = V$, then $XZ = YV$. For since $X : x :: Y : y$, and $Z : z :: V : v$, by multiplying these proportions (Chap. I. II.) $XZ : xz :: YV : yv$, therefore (Def. 5.) $XZ = YV$. In like manner in the case of division.

Cor. 1. The two sides of a proportional equation may be raised to any power, or any root may be extracted out of both, and the equation will continue to be true.

Thus, if $X = Y$, then $X^m = Y^m$; for since $X = Y$, $X : x :: Y : y$

Of Equations.

(A) These terms are used only with a view to give more precision to the ideas of beginners. In order to avoid the ambiguity in the meaning of the sign $=$, some writers employ the character $\propto$, to denote constant proportion; but this is seldom necessary, as the quantities compared are generally of different kinds, and the relation expressed is sufficiently obvious. See Emerson's Mathematics, vol. I.

Of Equations.

$X:x::Y:y$, and therefore $X^m:x^m::Y^m:y^m$; therefore $X^m=Y^m$. And if $X=Y$, also $X^m=Y^m$.

Cor. 2. If two proportional equations have a common side, that side will be as the square root of the product of the other two. Thus if $X=Y$, and $Y=Z$, by this Prop. $Y^2=XZ$, and (*Cor. 1.*) $Y=\sqrt{XZ}$. Hence also, in this case, $\sqrt{XZ}=X\pm Z$; for (*Prop. 3.*) $Y=X\pm Z$.

Cor. 3. If one side of a proportional equation be a factor of a side of another proportional equation, the remaining side of the former may be inserted in the latter, in place of that factor. Thus, if $X=ZY$, and $Z=\frac{1}{V}$, then $X=\frac{Y}{V}$, as appears by multiplying the two equations, and dividing by Z .

Prop. 5. Any proportional equation may be made absolute, by multiplying one side by a constant quantity.

Thus, if $X=Y$, then let two particular corresponding values of these variable quantities be assumed as constant, and let them be a and b , then $X:a::Y:b$, and $Xb=aY$, or $X=Y\times\frac{a}{b}$, an absolute equation.

Scholium.

1. If there be two variable physical quantities, either of the same, or of different kinds, which are so connected, that when the one is increased or diminished, the other is increased or diminished in the same proportion; or, if the magnitudes of the one, in any two situations, have the same ratio to each other, as the magnitudes of the other in the corresponding situations, the relations of the mathematical measures of these quantities may be expressed by a proportional equation, according to Def. 1.

2. If two variable physical quantities be so connected, that the one increases in the same proportion as the other is diminished, and conversely; or, if the magnitudes of the one, in any two situations, be reciprocally proportional to the magnitudes of the other, in the corresponding situations, the relation of their measures may be expressed by a proportional equation, according to Def. 2.

3. If three variable physical quantities are so connected, that one of them is increased or diminished, in proportion as both the others are increased or diminished; or, if the magnitudes of one of them, in any two situations, have a ratio which is compounded of the ratios of the magnitudes of the other two, in the corresponding situations; the relation of the measures of these three may be expressed by a proportional equation, according to Def. 3.

4. In like manner may the relations of other combinations of physical quantities be expressed according to Def. 4. And when these proportional equations are obtained, by reasoning with regard to them, according to the preceding propositions, new relations of the physical quantities may be deduced.

2. Examples of physical problems.

The use of algebra in natural philosophy, may be properly illustrated by some examples of physical problems. The solution of such problems must be derived from known physical laws, which, though ultimately

founded on experience, are here assumed as principles, and reasoned upon mathematically. The experiments by which the principles are ascertained admit of various degrees of accuracy; and on the degree of physical accuracy in the principles will depend the physical accuracy of the conclusions mathematically deduced from them. If the principles are inaccurate, the conclusions must, in like manner, be inaccurate; and, if the limits of inaccuracy in the principles can be ascertained, the corresponding limits, in the conclusions derived from them, may likewise be calculated.

Examp. 1. Let a glass tube, 30 inches (a) long, be filled with mercury, excepting 8 inches (b); and let it be inverted as in the Toricellian experiment, so that the 8 inches of common air may rise to the top: It is required to find at what height the mercury will remain suspended, the mercury in the barometer being at that time 28 inches (d) high.

The solution of this problem depends upon the following principles:

1. The pressure of the atmosphere is measured by the column of mercury in the barometer; and the elastic force of the air, in its natural state, which resists this pressure, is therefore measured by the same column.

2. In different states, the elastic force of the air is reciprocally as the spaces which it occupies.

3. In this experiment, the mercury which remains suspended in the tube, together with the elastic force of the air in the top of it, being a counterbalance to the pressure of the atmosphere, may therefore be expressed by the column of mercury in the barometer.

Let the mercury in the tube be x inches, the air in the top of it occupies now the space $a-x$; it occupied formerly b inches, and its elastic force was d inches of mercury: Now, therefore, the force must be $(a-x:b::d:)$

$\frac{bd}{a-x}$ inches. (2.) Therefore (3.) $x + \frac{bd}{a-x} = d$.

This reduced, and putting $a+d=2m$, the equation is $x^2-2mx=bd-ad$.

This resolved gives $x=m\pm\sqrt{m^2+bd-ad}$.

In numbers - - $x=44$ or 14 .

One of the roots 44 is plainly excluded in this case, and the other, 14, is the true answer. If the column of mercury x , suspended in the tube, were a counterbalance to the pressure of the atmosphere, expressed by the height of the barometer d , together with the measure of the elastic force of b inches of common air in the space $x-a$, that is, if $x=d+\frac{bd}{x-a}$, or $x-\frac{bd}{x-a}=d$,

the equation will be the same as before, and the root 44 would be the true answer. But the experiment in this question does not admit of such a supposition.

Examp. 2. The distance of the earth and moon (d) and their quantities of matter (t, l), being given, to find the point of equal attraction between them.

Let the distance of the point from the earth be x : Its distance from the moon will be therefore $d-x$. But gravitation is as the matter directly, and as the square of the distance inversely; therefore the earth's attraction is as $\frac{t}{x^2}$; and the moon's attraction is as $\frac{l}{(d-x)^2}$. But these are here equal; therefore,

Of Equations.

$$\frac{t}{x^2} = \frac{l}{d-x} \text{ and } \frac{\sqrt{t}}{x} = \frac{\sqrt{l}}{d-x}$$

This equation reduced gives $x = \frac{d\sqrt{t}}{\sqrt{t} + \sqrt{l}}$

Or mult. numerator and denominator by $\sqrt{t} - \sqrt{l}$ } $x = \frac{dt - d\sqrt{tl}}{t - l}$

In round numbers, let $d = 60$ semidiameters of the earth, $t = 40$, $l = 1$, then $x = 52$ semidiameters nearly. There is another point beyond the moon at which the attractions are equal, and it would be found by putting the square root of $d - x$ to be $x - d$, which, in this case, would be a positive quantity; and then $x = \frac{dt + d\sqrt{tl}}{t - l} = 72$ nearly. If the quantities had been multiplied before extracting the square roots, the affected quadratic would have given the same two roots.

Examp. 3. Let a stone be dropt into an empty pit; and let the time from the dropping of it to the hearing the sound from the bottom be given: To find the depth of the pit.

Let the given time be a ; let the fall of a heavy body in the first second of time (16.122 feet) be b : also, let the motion of sound in a second (1142 feet) be c .

Let the time of the stone's fall be	1	x
The time in which the sound of it moves to the top is	2	$a - x$
The descent of a falling body is as the square of the time, therefore the depth of the pit is ($1^2 : x^2 :: b :$)	3	bx^2
The depth from the motion of sound is also	4	$ca - cx$
Therefore 3 and 4	5	$bx^2 = ca - cx$

This equation being resolved, gives the value of x , and from it may be got bx^2 or $ca - cx$, the depth of the pit.

If the time is 10", then $x = 8.885$ nearly, and the depth is 1273 feet.

There are several circumstances in this problem which render the conclusion inaccurate.

1. The values of c and b , on which the solution is founded, are derived from experiments which are subject to considerable inaccuracies.

2. The resistance of the air has a great effect in retarding the descent of heavy bodies, when the velocity becomes so great as is supposed in this question; and this circumstance is not regarded in the solution.

3. A small error in making the experiment to which this question relates produces a great error in the conclusion. This circumstance is particularly to be attended to in all physical problems; and, in the present case, without noticing the preceding imperfections, an error of half a second, in estimating the time, makes an error of above 100 feet in the expression of the depth of the pit.

III. Of Interest and Annuities.

The application of algebra to the calculation of interests and annuities, will furnish proper examples of its use in business. Algebra cannot determine the propriety or justice of the common supposition on which these calculations are founded, but only the necessary conclusions resulting from them.

Notation.

In the following theorems let p denote any principal sum of which 1 l. is the unit, t the time during which it bears interest, of which one year shall be the unit, r the rate of interest of 1 l. for one year, and let s be the amount of the principal sum p with its interest for the time t at the rate r .

I. Of Simple Interest.

$s = p + ptr$, and of these four, s, p, t, r , any three being given, the fourth may be found by resolving a simple equation.

The foundation of the canon is very obvious; for the interest of 1 l. in one year is r , for t years it is tr , and for p pounds it is ptr ; the whole amount of principal and interest must therefore be $p + ptr = s$.

II. Of Compound Interest.

When the simple interest at the end of every year is supposed to be joined to the principal sum, and both to bear interest for the following year, money is said to bear compound interest. The same notation being used, let $1 + r = R$. Then $s = pR^t$.

For the simple interest of 1 l. in a year is r , and the new principal sum therefore which bears interest during the second year is $(1 + r)R$; the interest of R for a year is rR , and the amount of principal and interest at the end of the 2d year is $R + rR = R \times 1 + r = R^2$. In like manner, at the end of the 3d year it is R^3 , and at the end of t years it is R^t , and for the sum p it is $pR^t = s$.

Cor. 1. Of these four, p, R, t, s , any three being given the 4th may be found. When t is not very small, the solution will be obtained most conveniently by logarithms. When r is known, r may be found, and conversely.

Ex. If 500 l. has been at interest for 21 years, the whole arrear due, reckoning $4\frac{1}{2}$ per cent. compound interest, is 1260.12 l. or 1260 l. 2s. 5d. In this case $p = 500$, $R = 1.045$, and $t = 21$, and $s = 1260.12$, and any one of these may be derived by the theorem from the others being known. Thus, to find s ; $l.R^t = t \times l.R = 21 \times 0.0191163 = 0.4014423$, therefore $R^t = 2.52042$, and $s = (pR^t) = 500 \times 2.52042 = 1260.121$.

Cor. 2. The present worth of a sum (s) in reversion that is payable after a certain time t is found thus. Let the present worth be x , then this money improved by compound interest during t produces xR^t , which must be equal to s , and if $xR^t = s$, $x = \frac{s}{R^t}$.

Cor. 3. The time in which a sum is doubled at compound interest will be found thus. $pR^t = 2p$ and $R^t = 2$, and $t = \frac{l.2}{l.R}$; thus, if the rate is 5 per cent. $r = .05$, and $\frac{l.2}{l.1.05} = \frac{0.3010300}{0.0211893} = 14.2066$, that is 14 years and 75 days nearly.

Scholium.

Many other suppositions might be made with regard to the improvement of money by compound interest. The interest might be supposed to be joined to the capital, and along with it to bear interest at the end of

Of Equations.

every month, at the end of every day, or even at the end of every instant, and suitable calculations might be formed; but these suppositions being seldom used in practice, are omitted.

III. Of Annuities.

An annuity is a payment made annually for a certain term of years, and the chief problem with regard to it is, 'to determine its present worth.' The supposition on which the solution proceeds is, that the money received by the seller, being improved by him in a certain manner during the continuance of the annuity, amounts to the same sum as the several payments received by the purchaser, improved in the same manner. The suppositions with regard to the improvement may be various. What is called the *method of simple interest*, in which simple interest only is reckoned upon the purchase-money, and simple interest on each annuity from the time of payment, is so manifestly unequitable, as to be universally rejected; and the supposition which is now generally admitted in practice, is the highest improvement possible on both sides, viz. by compound interest. As the taking compound interest is prohibited by law, the realizing of this supposed improvement requires punctual payment of interest, and therefore the interest in such calculations is usually made low. Even with this advantage, it can hardly be rendered effectual in its full extent; it is however universally acquiesced in, as the most proper foundation of general rules; and when peculiar circumstances require any different hypothesis, a suitable calculation may be made.

Let then the annuity be called a , and let p be the present worth of it or purchase-money, t the time of its continuance, and let the other letters denote as formerly.

The seller, by improving the price received p , at compound interest, at the time the annuity ceases, has pR^t .

The purchaser is supposed to receive the first annuity a at the end of the first year, which is improved by him for $t-1$ years; it becomes therefore (Th. 2.) aR^{t-1} .

He receives the 2d annuity at the end of the 2d year, and when improved $t-2$, it becomes aR^{t-2} .

The third annuity becomes aR^{t-3} , &c.

The last annuity is simply a , therefore the whole amount of the improved annuities is the geometrical series $a + aR + aR^2$, &c. ... aR^{t-1} . The sum of the series, by Chap. VI. Sect. 2. is $a \times \frac{R^t - 1}{R - 1} = a \times \frac{R^t - 1}{r}$.

But, from the nature of the problem, $pR^t = a \times \frac{R^t - 1}{r}$,

$$\text{and hence } p = a \times \frac{R^t - 1}{rR^t} = a \times \frac{1 - \frac{1}{R^t}}{r}.$$

The same conclusion results from calculating the present worth of the several annuities, considered as sums payable in reversion.

Cor. 1. Of these four, p , a , R , t , any three being given, the fourth may be found, by the solution of equations; t is found easily by logarithms, R or r can be

found only by resolving an affected equation of the t order.

Cor. 2. If an annuity has been unpaid for the term t , the arrear, reckoning compound interest, will be $a \times \frac{R^t - 1}{r}$.

Cor. 3. The present worth of an annuity in reversion, that is to commence after a certain time (n), and then to continue t years, is found by subtracting the present worth for n years from the present worth for $n+t$ years, and then

$$p = a \times \frac{R^t - 1}{rR^n} = a \times \frac{1 - \frac{1}{R^t}}{rR^n}$$

Also of R , t , n , a , p , any four being given, the fifth may be found.

Cor. 4. If the annuity is to continue for ever, then $R^t - 1$ and R^t may be considered as the same; and $p = a \times \frac{R^t - 1}{rR^t} = \frac{a}{r}$.

Cor. 5. A perpetuity in reversion (by Cor. 3.) since $R^t - 1 = R^t$, is $p = \frac{a}{rR^n}$.

Prob. When 12 years of a lease of 21 were expired, a renewal for the same term was granted for 1000l.; 8 years are now expired, and for what sum must a corresponding renewal be made, reckoning 5 per cent. compound interest?

From the first transaction the yearly profit rent must be deduced; and from this the proper fine in the second may be computed.

In the first bargain, an annuity in reversion for 12 years, to commence 9 years hence, was sold for 1000l. the annuity will therefore be found by Cor. 3. in which

$$\text{all the quantities are given, but } a = p \times \frac{rR^n}{1 - \frac{1}{R^t}}.$$

and by inserting numbers, viz. $p = 1000$, $t = 12$, $n = 9$, $r = .05$, and $R = 1.05$; and working by logarithms $a = 175.029 = 175l. 7d.$

Next, having found a , the second renewal is made by finding the present worth of the annuity a in reversion, to commence 13 years hence, and to last 8 years. In the canon (Cor. 3.) insert for a 175.029, and let $t = 8$, $n = 13$, and $r = .05$, as before, $p = 599.93 = 599l. 18s. 6\frac{1}{2}d.$ The fine required.

As these computations often become troublesome, and are of frequent use, all the common cases are calculated in tables, from which the value of any annuity, for any time, at any interest, may easily be found.

It is to be observed also, that the preceding rules are computed on the supposition of the annuities being paid yearly; and therefore, if they be supposed to be paid half yearly or quarterly, the conclusions will be somewhat different, but they may easily be calculated on the preceding principles.

The calculations of life annuities depend partly upon the principles now explained, and partly on physical principles, from the probable duration of human life, as deduced from bills of mortality.

P A R T II.

Of the General Properties and Resolution of EQUATIONS of all Orders.

C H A P. I.

Of the Origin and Composition of Equations; and of the Signs and Coefficients of their Terms.

IN order to resolve the higher orders of equations, and to investigate their general affections, it is proper first to consider their origin from the combination of inferior equations.

As it would be impossible to exhibit particular rules for the solution of every order of equations, their number being indefinite; there is a necessity of deducing rules from their general properties, which may be equally applicable to all.

In the application of algebra to certain subjects, and especially to geometry, there may be an opposition in the quantities, analogous to that of addition and subtraction, which may therefore be expressed by the signs $+$ and $-$. Hence these signs may be understood by abstraction, to denote contrariety in general; and therefore, in this method of treating of equations, negative roots are admitted as well as positive. In many cases the negative will have a proper and determinate meaning; and when the equation relates to magnitude only, where contrariety cannot be supposed to exist, these roots are neglected, as in the case of quadratic equations formerly explained. There is besides this advantage in admitting negative roots, that both the properties of equations from which their resolution is obtained, and also those which are useful in the many extensive applications of algebra, become more simple and general, and are more easily deduced.

In this general method, all the terms of any equation are brought to one side, and the equation is expressed by making them equal to 0. Therefore, if a root of the equation be inserted instead of (x) the unknown quantity, the positive terms will be equal to the negative, and the whole must be equal to 0.

Def. When any equation is put into this form, the term in which (x) the unknown quantity is of the highest power is called the *First*, that in which the index of x is less by 1 is the second, and so on, till the last into which the unknown quantity does not enter, and which is called the *Absolute Term*.

Prop. I. If any number of equations be multiplied together, an equation will be produced, of which the dimension (A) is equal to the sum of the dimensions of the equations multiplied.

If any number of simple equations be multiplied together, as $x-a=0$, $x-b=0$, $x-c=0$, &c. it is obvious, that the product will be an equation of a dimension,

containing as many units as there are simple equations. In like manner, if higher equations are multiplied together, as a cubic and a quadratic, one of the fifth order is produced, and so on.

Conversely. An equation of any dimension is considered as compounded either of simple equations, or of others, such that the sum of their dimensions is equal to the dimension of the given one. By the resolution of equations these inferior equations are discovered, and by investigating the component simple equations, the roots of any higher equation are found.

Cor. 1. An equation admits of as many solutions, or has as many roots as there are simple equations which compose it, that is, as there are units in the dimension of it.

Cor. 2. And conversely, no equation can have more roots than the units in its dimension.

Cor. 3. Imaginary or impossible roots must enter an equation by pairs; for they arise from quadratics, in which both the roots are such.

Hence also, an equation of an even dimension may have all its roots, or any even number of them impossible, but an equation of an odd dimension must at least have one possible root.

Cor. 4. The roots are either positive or negative, according as the roots of the simple equations, from which they are produced, are positive or negative.

Cor. 5. When one root of an equation is discovered, one of the simple equations is found, from which the given one is compounded. The given equation, therefore, being divided by this simple equation, will give an equation of a dimension lower by 1. Thus, any equation may be depressed as many degrees as there are roots found by any method whatever.

Prop. II. To explain the general properties of the signs and coefficients of the terms of an equation.

Let $x-a=0$, $x-b=0$, $x-c=0$, $x-d=0$, &c. be simple equations, of which the roots are any positive quantities $+a$, $+b$, $+c$, $+d$, &c. and let $x+m=0$, $x+n=0$, &c. be simple equations, of which the roots are any negative quantities $-m$, $-n$, &c. and let any number of these equations be multiplied together, as in the following table:

$$\begin{array}{r}
 x-a=0 \\
 \times x-b=0 \\
 \hline
 =x^2-ax \\
 \quad -bx+ab \\
 \times x-c=0 \\
 \hline
 \end{array}
 \left. \vphantom{\begin{array}{r} x-a=0 \\ \times x-b=0 \\ \hline =x^2-ax \\ \quad -bx+ab \\ \times x-c=0 \\ \hline \end{array}} \right\} =0, \text{ a Quadratic.}$$

(A) The term *dimension*, in this treatise, is used in senses somewhat different, but so as not to create any ambiguity. In this chapter it means either the order of an equation, or the number denoting that order, which was formerly defined to be the highest exponent of the unknown quantity in any term of the equation.

Of Equations.

Then substitute for x and its powers, $\frac{y}{a}$ or y^2 and its powers, and the new equation of which y is the unknown quantity will have the property required.

Cor. 1. By this proposition an equation, in which the coefficient of the first term is any known quantity, as a , may be transformed into another, in which the coefficient of the first term shall be unit. Thus, let the equation be $ax^3 - px^2 + qx - r = 0$. Suppose $y = ax$, or $x = \frac{y}{a}$, and for x and its powers insert $\frac{y}{a}$ and its powers, and the equation becomes $\frac{y^3}{a^2} - \frac{py^2}{a^2} + \frac{qy}{a} - r = 0$, or $y^3 - py^2 + qay - a^2r = 0$. Also, let the equation be $5x^3 - 6x^2 + 7x - 30 = 0$; and if $x = \frac{y}{5}$, then $y^3 - 6y^2 + 35y - 750 = 0$.

Cor. 2. If the two transformations in Prop. 2. and 3. be both required, they may be performed either separately or together.

Thus, if it is required to transform the equation $ax^3 - px^2 + qx - r = 0$ into one which shall want the second term, and in which the coefficient of the first term shall be 1; let $x = \frac{y}{a}$, and then $y^3 - py^2 + qay - a^2r = 0$ as before; then let $y = z + \frac{1}{3}p$, and the new equation, of which z is the unknown quantity, will want the second term, and the coefficient of z^3 , the highest term is 1. Or if $x = \frac{z + \frac{1}{3}p}{a}$, the same equation as the last found will arise from one operation.

Ex. Let the equation be $5x^3 - 6x^2 + 7x - 30 = 0$. If $x = \frac{y}{5}$, then $y^3 - 6y^2 + 35y - 750 = 0$. And if $y = z + 2$, $z^3 + 23z - 696 = 0$. Also, at once, let $x = \frac{z+2}{5}$, and the equation properly reduced, by bringing all the terms to a common denominator, and then casting it off, will be $z^3 + 23z - 696 = 0$, as before.

Cor. 3. If there are fractions in an equation, they may be taken away, by multiplying the equation by the denominators, and by this proposition the equation may then be transformed into another, without fractions, in which the coefficient of the first term is 1. In like manner may a furd coefficient be taken away in certain cases.

Cor. 4. Hence also, if the coefficient of the second term of a cubic equation is not divisible by 3, the fractions thence arising in the transformed equation, wanting the second term, may be taken away by the preceding corollary. But the second term also may be taken away, so that there shall be no such fractions in the transformed equation, by supposing $x = \frac{z + \frac{1}{3}p}{3}$, $\pm p$ being the coefficient of the second term of the given equation. And if the equation $ax^3 - px^2 + qx - r = 0$ be given, in which p is not divisible by 3, by supposing $x = \frac{z + \frac{1}{3}p}{3a}$, the transformed equation reduced is $z^3 - 3p^2 + 9aq \cdot x - 2p^3 + 9apq - 7a^2r = 0$; wanting the second term, having 1 for the coefficient of the first

term, and the coefficients of the other terms being all integers, the coefficients of the given equation being also supposed integers.

General Corollary to Prop. 1. 2. 3.

If the roots of any of these transformed equations be found by any method, the roots of the original equation, from which they were derived, will easily be found from the simple equations expressing their relation. Thus, if 8 is found to be a root of the transformed equation $z^3 + 23z - 696 = 0$ (*Cor. 2. prop. 3.*)

Since $x = \frac{z+2}{5}$, the corresponding root of the given equation $5x^3 - 6x^2 + 7x - 30 = 0$ must be $\frac{8+2}{5} = 2$. It is to be observed also, that the reasoning in Prop 2. and 3. and the corollaries, may be extended to any order of equations, though in them it is applied chiefly to cubics.

CHAP. III.

Of the Resolution of Equations.

FROM the preceding principles and operations, rules may be derived for resolving equations of all orders.

I. CARDAN'S Rule for Cubic Equations.

The second term of a cubic equation being taken away, and the coefficient of the first term being made 1 (by *Cor. 1. Prop. 2. and Cor. 1. Prop. 3. Chap. II.*), it may be generally represented by $x^3 + 3qx + 2r = 0$; the sign + in all terms denoting the addition of them, with their proper signs. Let $x = m + n$, and also $mn = -q$; by the substitution of these values, an equation of the 6th order, but of the quadratic form, is deduced, which gives the values of m and n ; and hence,

$$(m+n)x = \sqrt[3]{-r + \sqrt{r^2 + q^3}} + \sqrt[3]{-r - \sqrt{r^2 + q^3}}; \text{ or } x = \sqrt[3]{-r + \sqrt{r^2 + q^3}} + \sqrt[3]{-r - \sqrt{r^2 + q^3}}.$$

Cor. 1. In the given equation, if $3q$ is negative, and if r^2 is less than q^3 , this expression of the root involves impossible quantities; while, at the same time, all the roots of that equation are possible. The reason is, that in his method of solution it is necessary to suppose that x the root may be divided into two parts, of which the product is q . But it is easy to show, that in this, which is called the *irreducible case*, it cannot be done.

For example, the equation (*Ex. 3. Sect. 3. of this Chapter*) $x^3 - 156x + 560 = 0$ belongs to the irreducible case, and the three roots are $+4$, $+10$, -14 ; and it is plain that none of these roots can be divided into two parts (m and n), of which the product can be equal to $(-q) = \frac{156}{3} = 52$; for the greatest product from the division of the greatest root -14 , is $-7 \times -7 = 49$ less than 52.

If the cube root of the compound furd can be extracted, the impossible parts balance each other, and the true root is obtained.

The geometrical problem of the trisection of an arch

Of Equations.

arch is resolved algebraically, by a cubic equation of this form; and hence the foundation of the rule for resolving an equation belonging to this case, by a table of lines.

Cor. 2. Biquadratic equations may be reduced to cubics, and may therefore be resolved by this rule.

Some other classes of equations, too, may be resolved by particular rules; but these, and every other order of equations, are commonly resolved by the general rules, which may be equally applied to all.

II. Solution of Equations whose roots are commensurate.

Rule 1. All the terms of the equation being brought to one side, find all the divisors of the absolute term, and substitute them successively in the equation for the unknown quantity. That divisor which, substituted in this manner, gives the result $=0$, shall be a root of the equation.

$$\text{Ex. 1. } \left. \begin{array}{l} x^3 - 3ax^2 + 2a^2x - 2a^2b \\ -bx^2 + 3abx \end{array} \right\} = 0.$$

The simple literal divisors of $-2a^2b$ are $a, b, 2a, 2b$, any of which may be inserted for x . Supposing $x=a$, the equation becomes

$$\left. \begin{array}{l} a^3 - 3a^3 + 2a^3 - 2a^2b \\ -ba^2 + 3a^2b \end{array} \right\} \text{ which is obviously } = 0.$$

$$\text{Ex. 2. } x^3 - 2x^2 - 33x + 90 = 0.$$

The divisors of 90 are 1, 2, 3, 5, 6, 9, 10, 15, 18, 30, 45, 90. Of Equations.

The first of these divisors, which being inserted for x , will make the result $=0$, is $+3$; $+5$ is another; and it is plain the last root must be negative, and it is -6 .

When 3 is discovered to be a root, the given equation may be divided by $x-3=0$, and the result will be a quadratic, which being resolved will give the other two roots, $+5$ and -6 .

The reason of the rule appears from the property of the absolute term formerly defined, viz. that it is the product of all the roots.

To avoid the inconvenience of trying many divisors, this method is shortened by the following.

Rule 2. Substitute in place of the unknown quantity successively three or more terms of the progression, 1, 0, -1 , &c. and find all the divisors of the sums that result; then take out all the arithmetical progressions that can be found among these divisors whose common difference is 1, and the values of x will be among those terms of the progressions which are the divisors of the result arising from the substitution of $x=0$. When the series increases, the roots will be positive; and when it decreases, the roots will be negative.

Examp. Let it be required to find a root of the equation $x^3 - x^2 - 10x + 6 = 0$.

The operation is thus:

Supposit.	Result.	Divisors.	Ar. pro.
$x = +1$	-4	1, 2, 4,	4
$x = 0$	$+6$	1, 2, 3, 6,	3
$x = -1$	$+14$	1, 2, 7, 14,	2

In this example there is only one progression, 4, 3, 2; and therefore 3 is a root, and it is -3 , since the series decreases.

It is evident from the rules for transforming equations (Chap. II.), that by inserting for $x+1 (=+e)$, the result is the absolute term of an equation of which the roots are less than the roots of the given equation by 1 ($=e$). *Cor. 4. Prop. 2.* When $x=0$, the result is the absolute term of the given equation. When for x is inserted $-1 (= -e)$, the result is the absolute term of an equation whose roots exceed the roots of the given equation by 1 ($=e$). Hence, if the terms of the series 1, 0, -1 , -2 , &c. be inserted successively for x , the results will be the absolute terms of so many equations, of which the roots form an increasing arithmetical series with the difference 1. But as the commensurate roots of these equations must be among the divisors of their absolute terms, they must also be among the arithmetical progressions found by this rule. The roots of the given equation therefore are to be sought for among the terms of these progressions which are divisors of the result, upon the supposition of $x=0$, because that result is its absolute term.

It is plain that the progression must always be increasing, only it is to be observed, that a decreasing series with the sign $+$ becomes increasing with the sign $-$. Thus, in the preceding example, $-4, -3,$

N^o 11.

-2 , is an increasing series, of which -3 is to be tried, and it succeeds.

If, from the substitution of three terms of the progression, 1, 0, -1 , &c. there arise a number of arithmetical serieses, by substituting more terms of that progression, some of the serieses will break off, and, of course, fewer trials will be necessary.

III. Examples of Questions producing the higher Equations.

Examp. 1. It is required to divide 161. between two persons, so that the cube of the one's share may exceed the cube of the other's by 386.

Let the greater share be x pounds,

And the less will be $16-x$;

$$\text{By the question, } x^3 - 16 - x^3 = 386.$$

$$\text{And by Inv. } 2x^3 - 48x^2 + 768x - 4096 = 386.$$

$$\text{Transp. and divide } x^3 - 24x^2 + 384x - 2241 = 0.$$

Suppos.	Results.	Divisors.
If $x = +1$;	-1880	1, 2, 4, 5, 8, 10, 20,
$x = 0$;	-2241	1, 3, 9, 27, 81.
$x = -1$;	-2650	1, 2, 5, 10, 25, 53.

Where 8, 9, 10, differ by 1; therefore $+9$ is to be tried; and being inserted for x , the equation is $=0$. The two shares then are 9 and 7 which succeed.

Since

Of Equations. Since $x=9$; $x-9=0$, is one of the simple equations from which this cubic is produced, therefore $x^3-24x^2+384x-2241=x^2-15x+249=0$. And the two roots of this quadratic are impossible.

Examp. 2. What two numbers are those whose product multiplied by the greater will produce 405, and their difference multiplied by the less 20?

Let the greater number be x , and the less y .

Then by quest. $\begin{cases} xy \times x = x^2y = 405 \\ x-y \times y = xy - y^2 = 20 \end{cases}$

Therefore $x = \frac{y^2+20}{y}$

And $x^2 = \frac{y^4+40y^2+400}{y^2}$

Also $x^2 = \frac{405}{y}$

Therefore $\frac{y^4+40y^2+400}{y^2} = \frac{405}{y}$

Mult. and transp. $y^4+40y^2-405y+400=0$.

This biquadratic, resolved by divisors, gives $y=5$:

and therefore $x=9$. Also $\frac{y^4+40y^2-405y+400}{y-5} = y^3+5y^2+65y-80=0$.

This cubic equation has one positive incommensurate root, viz. 1.114, &c. which may be found by the rule in the next section, and two impossible. The incommensurate root $y=1.114$, &c. gives $x=19.067$, &c. and these two answer the conditions very nearly.

Examp. 3. The sum of the squares of two numbers 208, and the sum of their cubes 2240 being given, to find them.

Let the greater be $x+y$, and the less $x-y$.

Then $(x+y)^2+(x-y)^2=2x^2+2y^2=208$

Hence $y^2=104-x^2$

Also $(x+y)^3+(x-y)^3=2x^3-6xy^2=2240$

Substitute for y^2 its value and $2x^3+624x-6x^3=2240$.

This reduced gives $x^3-156x+560=0$.

The roots of this equation are +10, +4, -14. If $x=10$, then $y=2$; and the numbers sought are 12 and 8, which give the only just solution. If $x=4$, then $y^2=88$ and $y=\sqrt{88}$. The numbers sought are therefore $4+\sqrt{88}$ and $4-\sqrt{88}$. The last is negative, but they answer the conditions. Lastly, if $x=-14$, then $y^2=-92$, hence $y=\sqrt{-92}$, is impossible; but still the two numbers $-14+\sqrt{-92}$, $-14-\sqrt{-92}$, being inserted, would answer the conditions. But it has been frequently observed, that such solutions are both useless and without meaning.

IV. Solution of Equations by Approximation.

By the former rules, the roots of equations, when they are commensurate, may be obtained. These, however, more rarely occur; and when they are incommensurate, we can find only an approximate value of them, but to any degree of exactness required. There are various rules for this purpose; one of the most simple is that of Sir Isaac Newton, which shall be now explained.

VOL. I. Part II.

Lemma. If any two numbers, being inserted for the unknown quantity (x) in any equation, give results with opposite signs, an odd number of roots must be between these numbers.

This appears from the property of the absolute term, and from this obvious maxim, that if a number of quantities be multiplied together, and if the signs of an odd number of them be changed, the sign of the product is changed. For, when a positive quantity is inserted for x , the result is the absolute term of an equation whose roots are less than the roots of the given equation by that quantity (Prop. 2. Cor. 3. Chap. II.) If the result has the same sign as the given absolute term, then from the property of the absolute term (Prop. 2. Chap. I.) either none, or an even number only, of the positive roots have had their signs changed by the transformation; but if the result has an opposite sign to that of the given absolute term, the signs of an odd number of the positive roots must have been changed. In the first case, then, the quantity substituted must have been either greater than each of an even number of the positive roots of the given equation, or less than any of them; in the second case, it must have been greater than each of an odd number of the positive roots. An odd number of the positive roots, therefore, must lie between them when they give results with opposite signs. The same observation is to be extended to the substitution of negative quantities and the negative roots.

From this lemma, by means of trials, it will not be difficult to find the nearest integer to a root of a given numeral equation. This is the first step towards the approximation; and both the manner of continuing it, and the reason of the operation, will be evident from the following example.

Let the equation be $x^3-2x-5=0$.

1. Find the nearest integer to the root. In this case a root is between 2 and 3; for these numbers being inserted for x , the one gives a positive, and the other a negative, result. Either the number above the root, or that below it, may be assumed as the first value; only it will be more convenient to take that which appears to be nearest to the root, as will be manifest from the nature of the operation.

2. Suppose $x=2+f$, and substitute this value of x in the equation.

$$\begin{aligned} x^3 &= 8 + 12f + 6ff + f^3 \\ -2x &= -4 - 2f \\ -5 &= -5 \\ x^3 - 2x - 5 &= 1 + 10f + 6f^2 + f^3 = 0. \end{aligned}$$

If f is less than unit, its powers f^2 and f^3 may be neglected in this first approximation, and $10f=1$, or 0.1 nearly, therefore $x=2.1$ nearly.

3. As $f=0.1$ nearly, let $f=.1+g$, and insert this value of f in the preceding equation.

$$\begin{aligned} f^3 &= 0.001 + 0.03g + 0.3g^2 + g^3 \\ 6f^2 &= 0.06 + 1.2g + 6g^2 \\ 10f &= 1 + 10g \\ -1 &= -1 \\ f^3 + 6f^2 + 10f - 1 &= 0.061 + 11.23g + 6.3g^2 + g^3 = 0 \\ \text{and neglecting } g^2 \text{ and } g^3 \text{ as very small } 0.061 + 11.23g &= 0, \\ &31 \end{aligned}$$

Application
to Geome-
try.

$= 0$, or $g = \frac{-0.061}{11.23} = -.0054$, hence $f = 0.1 + g =$
 $.0946$ nearly, and $x = 2.0946$ nearly.

4. This operation may be continued to any length, as by supposing $g = -.0054 + b$, and so on, and the value of $x = 2.09455147$ nearly.

By the first operation a nearer value of x may be found thus; since $f = .1$ nearly, and $-1 + 10f + 6f^2 + f^3 = 0$, $f = \frac{1}{10 + 6f + f^2}$, that is, $f = \frac{1}{10 + 6 + .01} = .094$ true to the last figure, and $x = 2.094$.

In the same manner may the root of a pure equation be found, and this gives an easy method of approximating to the roots of numbers which are not perfect powers.

This rule is applicable to numeral equations of every order; and, by assuming a general equation, general rules may be deduced for approximating to the roots of any proposed equation. By a similar method we may approximate to the roots of literal equations, which will be expressed by infinite series.

P A R T III.

Of the Application of ALGEBRA to GEOMETRY.

C H A P. I.

General Principles.

GEOMETRY treats both of the magnitude and position of extension, and their connections.

Algebra treats only of magnitude; therefore, of the relations which subsist in geometrical figures, those of magnitude only can be immediately expressed by algebra.

The opposite position of straight lines may indeed be expressed simply by the signs $+$ and $-$. But, in order to express the various other positions of geometrical figures by algebra from the principles of geometry, some relations of magnitude must be found, which depend upon these positions, and which can be exhibited by equations: And, conversely, by the same principles may the positions of figures be inferred from the equations denoting such relations of their parts.

Though this application of algebra appears to be indirect, yet such is the simplicity of the operations, and the general nature of its theorems, that investigations, especially in the higher parts of geometry, are generally easier and more expeditious by the algebraical method, though less elegant than by what is purely geometrical. The connections also, and analogies of the two sciences established by this application, have given rise to many curious speculations.

Geometry has been rendered far more extensive and useful, and algebra itself has received considerable improvements.

I. Of the Algebraical Expression of Geometrical Magnitudes.

A line, whether known or unknown, is represented by a single letter: a rectangle is properly expressed by the product of the two letters representing its sides: and a rectangular parallelepiped by the product of three letters; two of which represent the sides of any of its rectangular bases, and the third the altitude.

These are the most simple expressions of geometrical magnitudes; and any other which has a known proportion to these, may in like manner be expressed algebraically. Conversely, the geometrical magnitudes, represented by such algebraical quantities, may be found, only the algebraical dimensions above the third, not having any corresponding geometrical dimensions, must be expressed by proportionals (A).

The opposite position of straight lines, it has been remarked, may be expressed by the signs $+$ and $-$.

Thus, let a point A be given in the line

P A M P B

AP, any segment AP taken to the right hand being considered as positive, a segment Ap to the left is properly

(A) All algebraical dimensions above the third must be expressed by inferior geometrical dimensions; and though any algebraical quantities of two and three dimensions may be immediately expressed by surfaces and solids respectively, yet it is generally necessary to express them, and all superior dimensions, by lines.

If, in any geometrical investigation by algebra, each line is expressed by a single letter, and each surface or solid by an algebraical quantity of two or three dimensions respectively, then whatever legitimate operations are performed with regard to them, the terms in any equation derived will, when properly reduced, be all of the same dimension; and any such equation may be easily expressed geometrically by means of proportionals, as in the following example.

Thus, if the algebraical equation $a^4 + b^4 = c^4 - d^4$, is to be expressed geometrically, a, b, c , and d , being supposed to represent straight lines; let $a : b :: e : f : g$, in continued proportion, then $a^4 : b^4 :: a : g$ and $a^4 : a^4 + b^4 :: a : a + g$; then let $a : c :: h : l$, and $a^4 : c^4 :: a : l$; also, let $c : d :: m : n : p$, and $c^4 : d^4 :: c : p$, or $c^4 : c^4 - d^4 :: c : c - p$. By combining the two former proportions (Chap. II. Part I.), $c^4 : a^4 + b^4 :: l : a + g$, and combining the latter with this last found, $c^4 - d^4 : a^4 + b^4 :: c - p : l$; therefore $c - p : l :: c : a + g$, and $c : c - p :: l : a + g$.

Application
to Geome-
try.

perly represented by a negative quantity. If a and b represent two lines; and if, upon the line AB from the point A , AP be taken towards the right equal to a , it may be expressed by $+a$; then PM taken to the left and equal to b , will be properly represented by $-b$, for AM is equal to $a-b$. If $a=b$, then M will fall upon A , and $a-b=0$. By the same notation, if b is greater than a , M will fall to the left of A ; and in this case, if $2a=b$, and if Pp be taken equal to b , then $a-b=-a$ will represent Ap , which is equal to a , and situated to the left of A . This use of the signs, however, in particular cases, may be precluded, or in some measure restrained.

The positions of geometrical figures are so various, that it is impossible to give general rules for the algebraical expression of them. The following are a few examples.

An angle is expressed by the ratio of its sine to the radius; a right angle in a triangle, by putting the squares of the two sides equal to the square of the hypotenuse; the position of points is ascertained by the perpendiculars from them on lines given in position; the position of lines by the angles which they make with given lines, or by the perpendiculars on them from given points; the similarity of triangles by the proportionality of their sides which gives an equation, &c.

These and other geometrical principles must be employed both in the demonstration of theorems and in the solution of problems. The geometrical proposition must first be expressed in the algebraical manner, and the result after the operation must be expressed geometrically.

II. The Demonstration of Theorems.

All propositions in which the proportions of magnitudes only are employed, also all propositions expressing the relations of the segments of a straight line, of their squares, rectangles, cubes, and parallelopipeds, are demonstrated algebraically with great ease. Such demonstrations, indeed, may in general be considered as an abridged notation of what are purely geometrical.

This is particularly the case in those propositions which may be geometrically deduced without any construction of the squares, rectangles, &c. to which they refer. From the first proposition of the second book of Euclid, the nine following may be easily derived in this manner, and they may be considered as proper examples of this most obvious application of algebra to geometry.

If certain positions are either supposed or to be inferred in a theorem, we must find, according to the preceding observations, the connection between these positions and such relations of magnitude as can be expressed and reasoned upon by algebra. The algebrai-

cal demonstrations of the 12th and 13th propositions of the 2d book of Euclid, require only the 47th of the 1. El. The 35th and 36th of the 3d book require only the 3. III. El. and 47. I. El.

Application
to Geome-
try.

From a few simple geometrical principles alone, a number of conclusions, with regard to figures, may be deduced by algebra; and to this in a great measure is owing the extensive use of this science in geometry. If other more remote geometrical principles are occasionally introduced, the algebraical calculations may be much abridged. The same is to be observed in the solution of problems; but such in general are less obvious, and more properly belong to the strict geometrical method.

III. Of the Solution of Problems.

Upon the same principles are geometrical problems to be resolved. The problem is supposed to be constructed, and proper algebraical notations of the known and unknown magnitudes are to be sought for, by means of which their connections may be expressed by equations. It may first be remarked, as was done in the case of theorems, that in those problems which relate to the division of the line and the proportions of its parts, the expression of the quantities, and the stating their relations by equations, are so easy as not to require any particular directions. But when various positions of geometrical figures and their properties are introduced, the solution requires more attention and skill. No general rules can be given on this subject, but the following observations may be of use.

1. The construction of the problem being supposed, it is often farther necessary to produce some of the lines till they meet; to draw new lines joining remarkable points; to draw lines from such points perpendicular or parallel to other lines, and such other operations as seem conducive to the finding of equations; and for this purpose, those especially are to be employed which divide the scheme into triangles that are given, right angled or similar.

2. It is often convenient to denote by letters, not the quantities particularly sought, but some others from which they can easily be deduced. The same may be observed of given quantities.

3. The proper notation being made, the necessary equations are to be derived by the use of the most simple geometrical principles; such as the addition and subtraction of lines or of squares, the proportionality of lines, particularly of the sides of similar triangles, &c.

4. There must be as many independent equations as there are unknown quantities assumed in the investigation, and from these a final equation may be inferred by the rules of Part I.

If the final equation from the problem be resolved, the roots may often be exhibited geometrically; but the geometrical construction of problems may be effected

3 I 2

fectcd

If any known line is assumed as 1, as its powers do not appear, the terms of an equation, including any of them, may be of very different dimensions; and before it can be properly expressed by geometrical magnitudes, the deficient dimensions must be supplied by powers of the 1. When an equation has been derived from geometrical relations, the line denoting 1 is known; and when an assumed equation is to be expressed by the relations of geometrical magnitudes, the 1 is to be assumed.

In this manner may any single power be expressed by a line. If it is x^5 , then to 1, x find four quantities in continued proportion; so that $1:x:m:n:p:q$, then $1:q::1^5:x^5$, or $q=x^5$; and so of others.

Application
to Geome-
try.

affected also without resolving the equation, and even without deducing a final equation, by the methods afterwards to be explained.

If the final equation is simple or quadratic, the roots being obtained by the common rules, may be geometrically exhibited by the finding of proportionals, and the addition or subtraction of squares.

By inserting numbers for the known quantities, a numeral expression of the quantities sought will be obtained by resolving the equation. But in order to determine some particulars of the problem besides finding the unknown quantities of the equation, it may be farther necessary to make a simple construction; or, if it is required that every thing be expressed in numbers, to substitute a new calculation in place of that construction.

PROP. I. To divide a given straight line AB into two parts, so that the rectangle contained by the whole line and one of the parts may be equal to the square of the other part.

Let C be the point of division, and let $AB = a$, $AC = x$, and then $CB = a - x$. From the problem $a^2 - ax = x^2$; and this equation being resolved (Chap.

V. P. II.) gives $x = \frac{a \pm \sqrt{a^2 + a^2}}{2}$.

The quantity $\sqrt{a^2 + \frac{a^2}{4}}$ is the hypotenuse of a right angled triangle, of which the two sides are a and $\frac{a}{2}$, and is therefore easily found; $\frac{a}{2}$ being taken from this line, gives $x = AC$, which is the proper solution. But if a line Ac be taken on the opposite side of A, and equal to the above mentioned hypotenuse, together with $\frac{a}{2}$ it will represent the negative root $-\sqrt{a^2 + \frac{a^2}{4}}$.

$-\frac{a}{2}$, and will give another solution; for in this case also $AB \times Bc = Ac^2$. But c is without the line AB; and therefore, if it is not considered as making a division of AB, this negative root is rejected.

This solution coincides with what is given by Euclid. For $\sqrt{a^2 + \frac{a^2}{4}}$ is equal (see the fig. of Prop. I. 11th

II. B. Eucl. Simson's edit.) to EB or EF, and therefore $x = \sqrt{a^2 + \frac{a^2}{4}} - \frac{a}{2} = EF - EA = AF = AH$; and

the point H corresponds to C in the preceding figure.

Besides, if on $EF + EA = CF$ (instead of $EF - EA = FA$) a square be described on the opposite side of CF from AG, BA produced will meet a side of it in a point; which if it be called K, will give $KB \times BA = KA^2$. K corresponds to c, and this solution will correspond with the algebraical solution by means of the negative root.

If CB had been called x , and $AC = a - x$, the equation would be $ax = a^2 - 2ax + x^2$, which gives $x = \frac{3a \pm \sqrt{5a^2}}{2}$, in which both roots are positive, and the

solutions derived from them coincide with the preceding. If the solution be confined to a point within the line, then one of the positive roots must be rejected, for one of the roots of the compound square

from which it is derived is $x - \frac{3a}{2}$, a negative quantity,

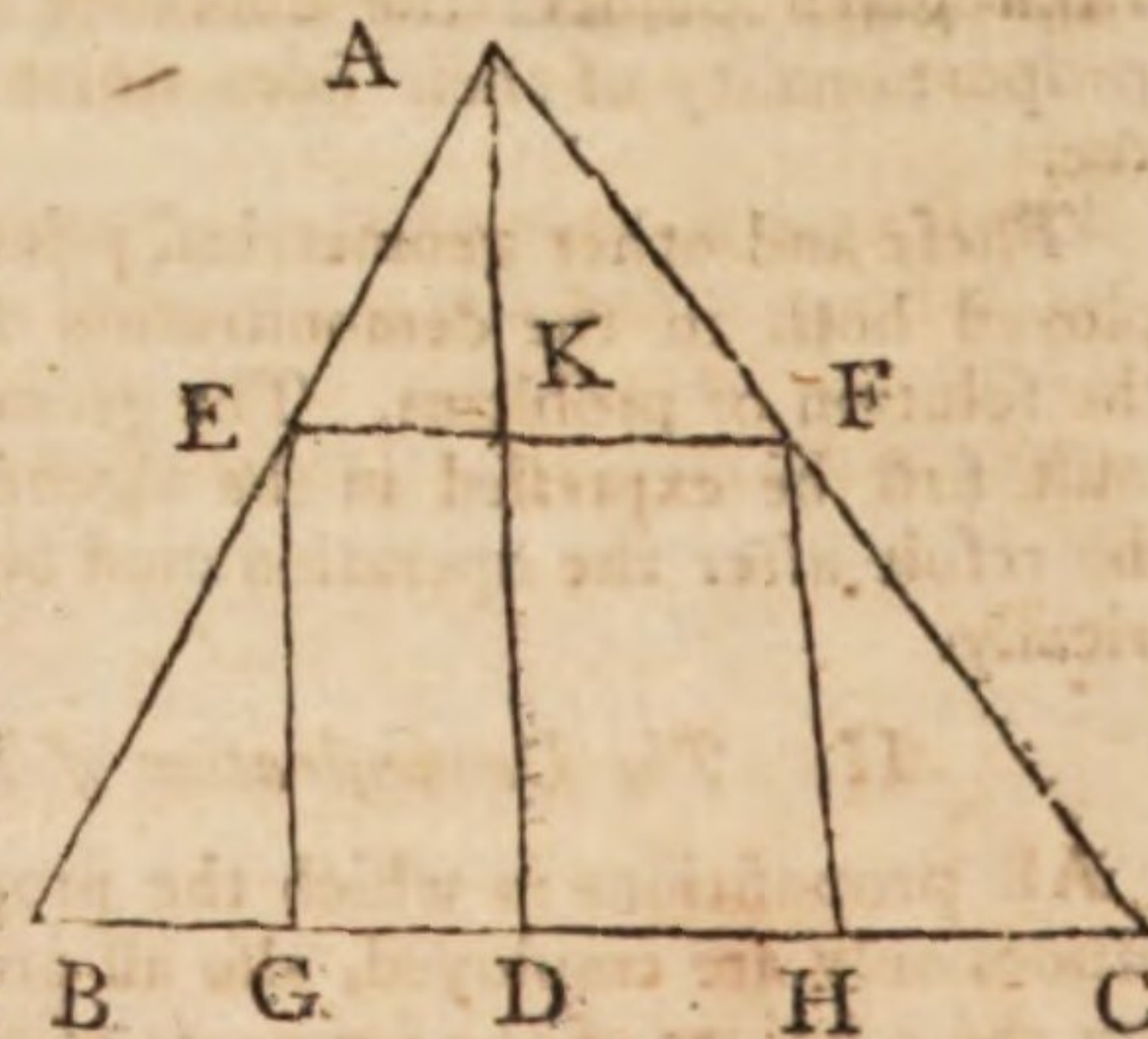
which in this strict hypothesis is not admitted. In such a problem, however, both constructions are generally received, and considered even as necessary to a complete solution of it.

If a solution in numbers be required, let $AB = 10$, then $x = \frac{10 \pm \sqrt{125}}{2} = 5 \pm \sqrt{3.125}$. It is plain, whatever be the value of AB, the roots of this equation are incommensurate, though they may be found, by approximation, to any degree of exactness required. In this case, $x = 11.1803 - 5$, nearly; that is $AC = 6.1803$, nearly; and $Ac = 16.1803$, nearly.

PROP. II. In a given Triangle ABC to inscribe a Square.

Suppose it to be done, and let it be EFHG. From A let AD be perpendicular on the base BC, meeting EF in K.

Let $BC = a$, and $AD = p$, both of which are given because the triangle is given. Let AK be assumed as the unknown quantity, because from it the square can easily be constructed; and let it be called x . Then $(KD = EG =) EF = p - x$.



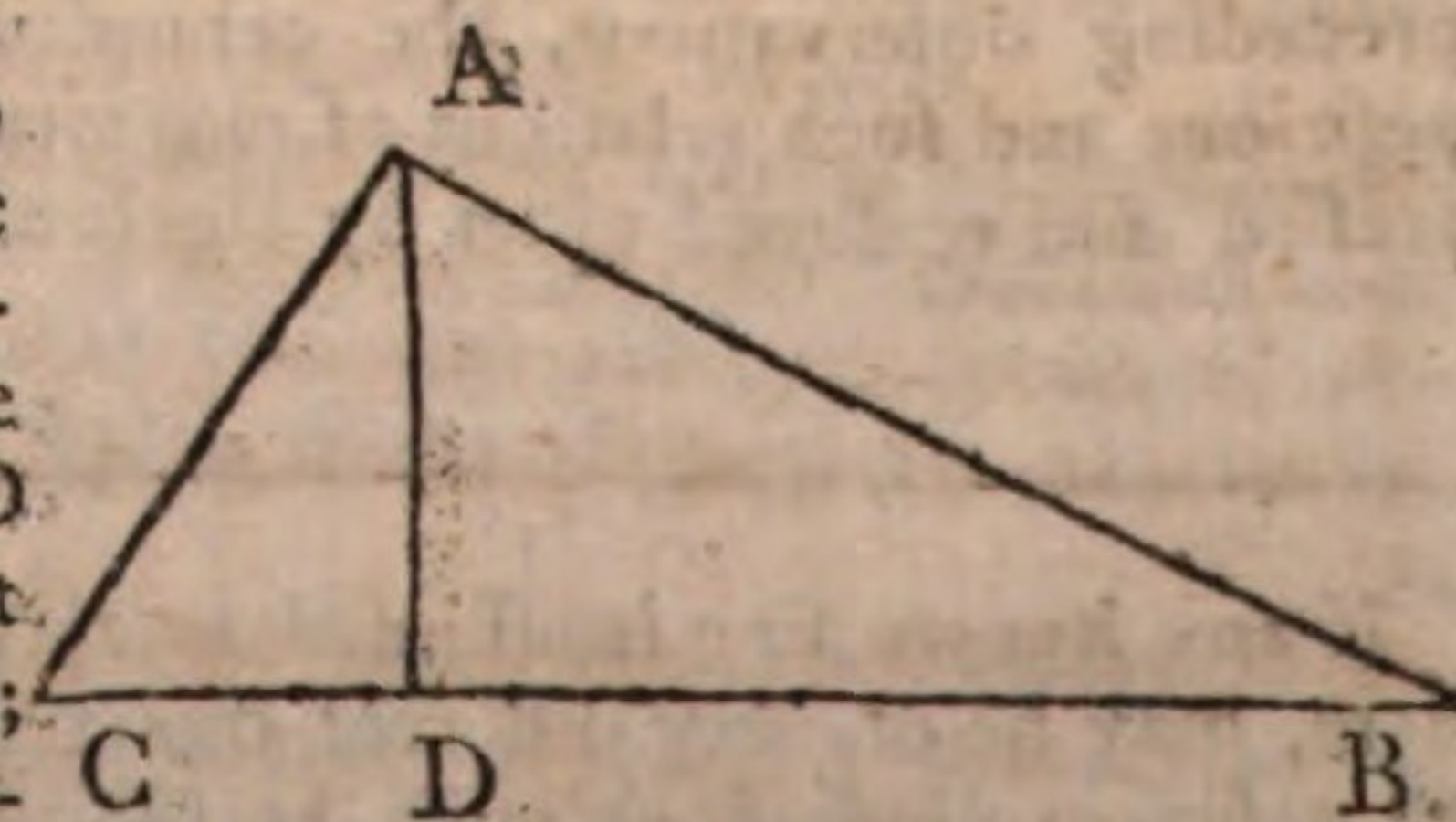
On account of the parallels EF, BC, $AD : BC :: AK : EF$; that is, $p : a :: x : p - x$, and $p^2 - px = ax$, which equation being resolved, gives $x = \frac{p^2}{p + a}$.

Therefore x or AK is a third proportional to $p + a$ and p , and may be found by 11. VI. El. The point K being found, the construction of the square is sufficiently obvious.

PROP. III. In the right-angled Triangle ABC, the Base BC, and the Sum of the Perpendicular and Sides BA + AC + AD being given, to find the Triangle.

Such parts of this triangle are to be found as are necessary for describing it: The perpendicular AD will be sufficient for this purpose; and let it be called x : Let $AB +$

$AC + AD = a$, $BC = b$; therefore $BA + AC = a - x$. Let



Application
to Geome-
try.

Let $BA - AC$ be denoted by y , then $BA = \frac{a+y-x}{2}$, and $AC = \frac{a-x-y}{2}$. But [47. I. El.] $BC^2 = BA^2 + AC^2$, which being expressed algebraically, becomes $b^2 = \left(\frac{a+y-x}{2}\right)^2 + \left(\frac{a-x-y}{2}\right)^2 = \frac{a^2 - 2ax + x^2 + y^2}{2}$. Likewise, from a known property of right-angled triangles, $BC \times AD = BA \times AC$; that is, $bx = \left(\frac{a+y-x}{2} \times \frac{a-x-y}{2}\right) = \frac{a^2 - 2ax + x^2 - y^2}{4}$. This last equation being multiplied by 2, and added to the former, gives $b^2 + 2bx = a^2 - 2ax + x^2$, which being resolved according to the rules of Part I. Chap. V. gives $x = a + b - \sqrt{2ab + 2b^2}$.

To construct this: $a + b$ is the sum of the perimeter and perpendicular, and is given; $\sqrt{2ab + 2b^2} = \sqrt{a + b \times 2b}$ is a mean proportional between $a + b$ and $2b$, and may be found; therefore, from the sum of the perimeter and perpendicular subtract the mean proportional between the said sum and double the base, and the remainder will be the perpendicular required.

From the base and perpendicular the right-angled triangle is easily constructed.

In numbers, let $BA + AC + AD = 18.8 = a$; $BC = 10 = b$; then $AD = a + b - \sqrt{2ab + 2b^2} = 28.8 - \sqrt{576} = 4.8 = x$, and $BA + AC = 14$. By either of the first equations $y^2 = 2b^2 + 2ax - a^2 - x^2 = 4$ and $y = BA - AC = 2$; therefore $BA = 8$, and $AC = 6$.

The geometrical expression of the roots of final equations arising from problems may be found without resolving them by the intersection of geometrical lines. Thus, the roots of a quadratic are found by the intersections of the circle and straight line, those of a cubic and biquadratic, by the intersection of two conic sections, &c.

The solution of problems may be effected also by the intersections of the *loci* of two intermediate equations without deducing a final equation. But these two last methods can only be understood by the doctrine of the *loci* of equations.

CHAP. II.

Of the Definition of Lines by Equations.

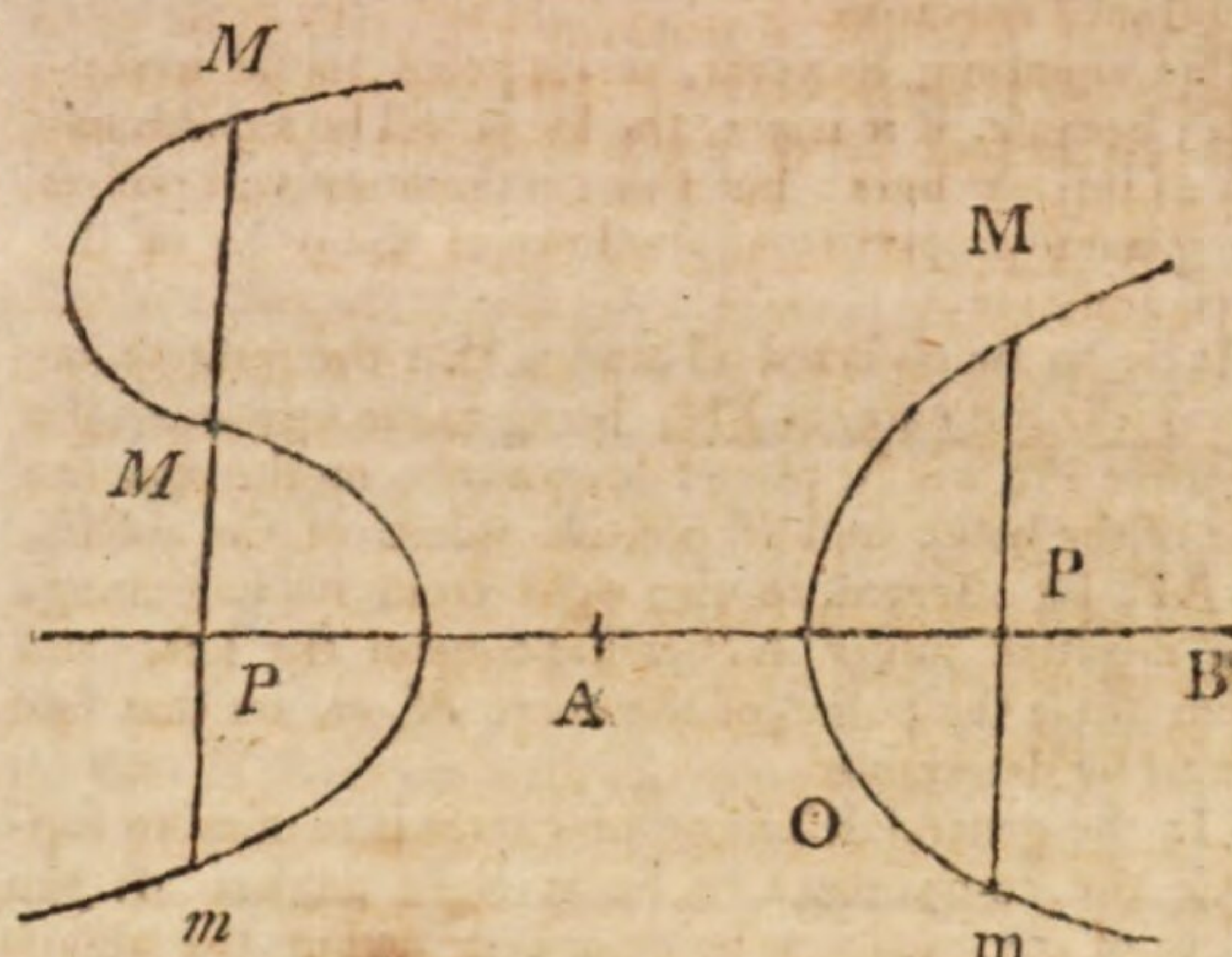
LINES which can be mathematically treated of must be produced according to an uniform rule, which determines the position of every point of them.

This rule constitutes the *definition* of any line from which all its other properties are to be derived.

A straight line has been considered as so simple as to be incapable of definition. The curve lines here treated of are supposed to be in a plane; and are defined either from the section of a solid by a plane, or more universally by some continued motion in a plane,

according to particular rules. Any of the properties which are shown to belong peculiarly to such a line, may be assumed also as the definition of it, from which all the others, and even what upon other occasions may have been considered as the primary definition, may be demonstrated. Hence lines may be defined in various methods, of which the most convenient is to be determined by the purpose in view. The simplicity of a definition, and the ease with which the other properties can be derived from it, generally give a preference.

Definitions. 1. When curve lines are defined by equations, they are supposed to be produced by the extremity of one straight line, as PM moving in a given angle along another straight line AB given in position, which is called the base.



2. The straight line PM moving along the other, is called an *ordinate*, and is usually denoted by y .

3. The segment of the base AP between a given point in it A , and an ordinate PM , is called an *absciss* with respect to that ordinate, and is denoted by x . The ordinate and absciss together are called *co-ordinates*.

4. If the relation of the variable absciss and ordinate AP and PM be expressed by an equation, which besides x and y contains only known quantities, the curve MO described by the extremity of the ordinate, moving along the base, is called the *locus* of that equation.

5. If the equation is finite, the curve is called *algebraical* (A). It is this class only which is here considered.

6. The *dimensions* of such equations are estimated from the highest sum of the exponents of x and y in any term. According to this definition, the terms x^4 , x^3y , x^2y^2 , xy^3 , y^4 , are all of the same dimension.

7. Curve lines are divided into *orders* from the dimensions of their equations, when freed from fractions and surds.

In these general definitions, the straight line is supposed to be comprehended, as it is the locus of simple equations. The loci of quadratic equations are shown to

(A) The terms *geometrical* and *algebraical*, as applied to curve lines, are used in different senses by different writers; there are several other classes of curves besides what is here called algebraical, which can be treated off mathematically, and even by means of algebra. See Scholium at the end.

Application to Geometry. to be the conic sections, which are hence called lines of the second order, &c.

It is sufficiently plain from the nature of an equation, containing two variable quantities, that it must determine the position of every point of the curve, defined by it in the manner now described; for if any particular known value of one of the variable quantities as of x be assumed, the equation will then have one unknown quantity only, and being resolved, will give a precise number of corresponding values of y , which determine so many points of the curve.

As every point of the locus of an equation has the same general property, it must be one curve only, and from this equation all its properties may be derived. It is plain also, that any curve line defined from the motion of a point, according to a fixed rule, must either return into itself, or be extended *ad infinitum* with a continued curvature.

The equation, however, is supposed to be irreducible; because, if it is not, the locus will be a combination of inferior lines: but this combination will possess the general properties of the lines of the order of the given equation.

It is to be observed all along, that the positive values of the ordinate, as PM, being taken upwards, the negative Pm will be placed downwards, on the opposite side of the base: and if positive values of the absciss, as AP, be assumed to the right from its beginning, the negative values AP will be upon the left, and from these the points of the curve M, m , on that side are to be determined.

In the general definition of curves it is usual to suppose the co-ordinates to be at right angles. If the locus of any equation be described, and if the absciss be assumed on another base, and the ordinate be placed at a different angle, the new equation expressing their relation, though of a different form, will be of the same order as the original equation; and likewise will have, in common with it, those properties which distinguish the equations of that particular curve.

This method of defining curves by equations may not be the fittest for a full investigation of the properties of a particular curve; but as their number is without limit, such a minute inquiry concerning all, would be not only useless, but impossible. It has this great advantage, however, that many of the general affections of all curves; and of the distinct orders, and also some of the most useful properties of particular curves, may be easily derived from it.

I. The Determination of the Figure of a Curve from its Equation.

The general figure of the curve may be found by substituting successively particular values of x the absciss, and finding by the resolution of these equations the corresponding values of y the ordinate, and of consequence so many points of the curve. If numeral values be substituted for x , and also certain numbers for the known letters, the resolution of the equation gives numeral expressions of the ordinates; and from these, by means of scales, a mechanical description of the curve will be obtained, which may often be useful, both in pointing out the general disposition of the figure, and also in the practical applications of geometry.

Some more general suppositions may be of use in determining the figure; but these can be suggested only from the particular form of the equation in view. By supposing x to have certain relations to the known quantities, the values of y may become more simple, and the equation may be reduced to such a form as to show the direction of the curve, and some of its obvious properties.

The following general observations may also be laid down:

1. If in any case a value of y vanishes, then the curve meets the base in a point determined by the corresponding value of x . Hence by putting $y=0$, the roots of the equation, which in that situation are values of x , will give the distances on the base from the point assumed as the beginning of x , at which the curve meets it.

2. If at a particular value of x , y becomes infinite, the curve has an infinite arc, and the ordinate at that point becomes an asymptote.

3. If when x becomes infinitely great, y vanishes, the base becomes an asymptote.

4. If any value of y becomes impossible, then so many intersections of the ordinate and curve vanish. If at any value of x all the values of y become impossible, the ordinate does not there meet the curve.

5. If two values of y become equal and have the same sign, the ordinate in that situation either touches the curve, or passes through an intersection of two of its branches, which is called a *punctum duplex*, or through an oval become infinitely little, called a *punctum conjugatum*.

In like manner is a *punctum triplex*, &c. to be determined.

The following example will illustrate this doctrine.

Let the equation be $ay^2 - xy^2 = x^3 + bx^2$:

Therefore, $y^2 = \frac{x^3 + bx^2}{a-x}$ and $y = \pm \sqrt{\frac{x^3 + bx^2}{a-x}}$

$$= \pm \sqrt{\frac{a+b}{a-x}} \times x.$$

Let AB be assumed as a base on which the abscissae are to be taken from A, and the ordinates perpendicular to it.

Since the two values of y are equal, but have opposite signs; PM, and Pm which represent them, must be taken equal to each other on opposite sides of AB; and it is plain that the parts of the curve on the two sides of AB must be every way similar and equal.

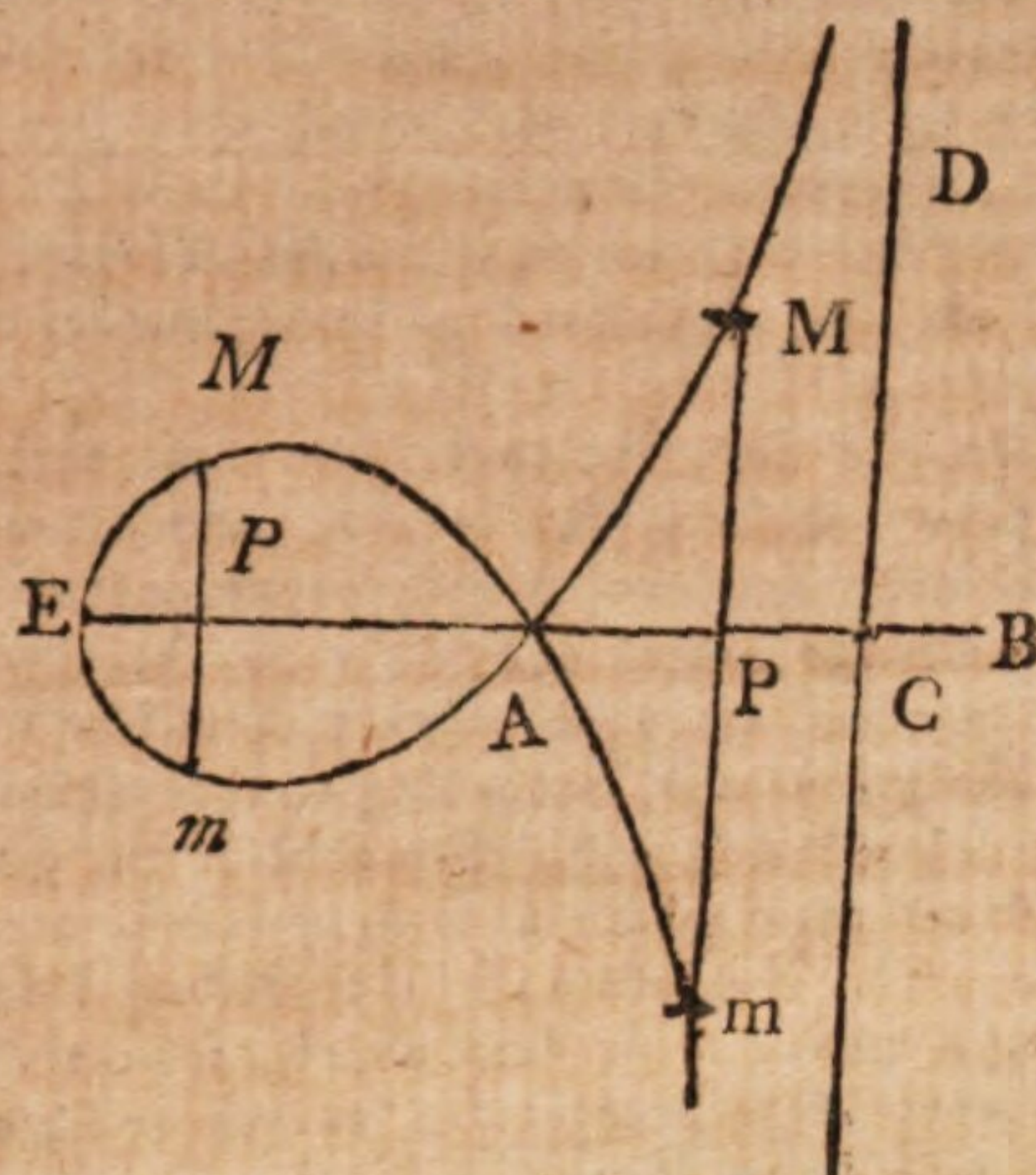
If x is made equal to a , then $y = x \sqrt{\frac{x+b}{0}}$

which is an algebraical expression for infinity; therefore if AC is taken equal to a , the perpendicular CD will become an asymptote to the curve, which will have two infinite arcs (Obs. 2). If x is greater than a , the quantity under the radical sign becomes negative, and the values of y are impossible; that is, no part of the curve lies beyond CD (4.)

Both branches of the curve pass through A, since $y=0$, when $x=0$ (1.) Let x be negative, and $y = \pm \sqrt{\frac{b-x}{a+x}}$; the values of y will be possible, if x is not greater than b ; but if $x=b$, then $y=0$, and if x is greater

Application to Geometry. If b is negative, then E is to the right of A , which will now be a punctum conjugatum. The rest of the curve will be between E and C , and CD becomes an asymptote.

er than b , the values of y become impossible; that is, if the absciss AP be taken to the left of A , and less than b , there will be two real equal values of y , viz. PM , Pm on the opposite sides as before; if AE be taken equal to b the curve will pass through E , and no part of it is beyond E (1. and 4.)



The portion between A and E is called a *Nodus*.

If y be put $=0$, then the values of x are 0 , 0 , $-b$; that is, the curve passes twice through A , or A is a punctum duplex, and it passes also through E as before (1.)

The mechanical description of curves mentioned in the beginning of this section, may be illustrated by the preceding example. For this purpose, let any numeral values of a and b be assumed; and if successive numeral values of x be inserted, corresponding numeral values of y will be obtained, by which so many points in the curve may be constructed.

Let $AC=a=10$; $AE=b=12$; and first let $x=1$, then $y=\pm x\sqrt{\frac{x+b}{a-x}}=\pm\sqrt{\frac{13}{9}}=\pm 1.2$ nearly, which gives the length of the ordinates when the absciss is 1; and in the same manner are the ordinates to be found when x is 2, 3, or any other number. Thus, if $x=6$, then $y=\pm 6\sqrt{\frac{18}{4}}=\pm 12.73$ nearly; and if AP be taken from the scale of equal parts (according to which AB and AE are supposed to be laid down) and equal to 6, then PM , Pm , being taken from the same scale, each equal to 12.73, will give the points of the curve M , m . In like manner, if $x=-9$, $y=\pm 9\sqrt{\frac{3}{19}}=\pm 3.58$, nearly; and if $AP=9$, then PM , Pm being taken from the same scale equal to 3.58, will give the points M , m . In the same manner may any number of points be found, and these being joined, will give a representation of the curve, which will be more or less just, according to the number of points found, and the accuracy of the several operations employed.

By the same methods the locus of any other equation is to be traced: Thus, by varying the former equation, the figure of its locus will be varied. If $b=0$, then the points A and E coincide, the nodus vanishes, and A is called a *cusps*.

If b is negative, then E is to the right of A , which will now be a punctum conjugatum. The rest of the curve will be between E and C , and CD becomes an asymptote.

If $a=0$, then $-xy^2=x^3-bx^2$, or $y^2=bx-x^2$, which is an equation to the circle of which $b=AE$ is the diameter.

II. General Properties of Curves from their Equations.

The general properties of equations lead to the general affections of curve lines. For example,

A straight line may meet a curve in as many points as there are units in the dimension of its equation; for so many roots may that equation have. An asymptote may cut a curve line in as many points, excepting two, as it has dimensions, and no more. The same may be observed of the tangent.

Impossible roots enter an equation by pairs; therefore the intersection of the ordinate and curve must vanish by pairs.

The curves of which the number expressing the order is odd, must have at least two infinite arcs; for the absciss may be so assumed, that, for every value of it, either positive or negative, there must be at least one value of y , &c.

The properties of the coefficients of the terms of equations, mentioned Part II. Chap. I. furnish a great number of the curious and universal properties of curve lines. For example, the second term of an equation is the sum of the roots with the signs changed; and if the second term is wanting, the positive and negative roots must be equal. From this it is easy to demonstrate, "That if each of two parallel straight lines meet a curve line in as many points as it has dimensions, and if a straight line cut these two parallels, so that the sum of the segments of each on one side be equal to the sum of the segments on the other, this straight line will cut any other line parallel to these in the same manner." Analogous properties, with many other consequences from them, may be deduced from the composition of the coefficients of the other terms.

Many properties of a particular order of curves may be inferred from the properties of equations of that order. Thus, "If a straight line cut a curve of the third order in three points, and if another straight line be drawn, making a given angle with the former, and cutting the curve also in three points, the parallelogram by the segments of one of these lines between its intersection with the other, and the points where it meets the curve, will be to the parallelogram by the like segments of the other line in a given ratio." This depends upon the composition of the absolute term, and may be extended to curves of any order.

III. The Subdivision of Curves.

As lines are divided into orders from the dimensions of their equations, in like manner, from the varieties of the equations of any order, may different *genera* and *species* of that order be distinguished, and from the peculiar properties of these varieties, may the affections of the particular curves be discovered.

For this purpose a complete general equation is assumed of that order, and all the varieties in the terms and coefficients which can affect the figure of the locus are enumerated.

Application
to Geome-
try.

It was formerly observed, that the equations belonging to any one curve may be of various forms, according to the position of the base, and the angle which the ordinate makes with it, though they be all of the same order, and have also certain properties, which distinguish them from the other equations of that order.

The locus of simple equations is a *straight line*. There are *three* species of lines of the second order, which are easily shown to be the *conic sections*, reckoning the circle and ellipse to be one. *Seventy-eight* species have been numbered of the third order: And as the superior orders become too numerous to be particularly reckoned, it is usual only to divide them into certain general classes.

A complete arrangement of the curves of any order would furnish canons, by which the species of a curve whose equation is of that order might be found.

IV. Of the place of Curves defined from other principles in the Algebraical System.

If a curve line be defined from the section of a solid, or from any rule different from what has been here supposed, an equation to it may be derived, by which its order and species in the algebraical system may be found. And, for this purpose, any base and any angle of the co-ordinates may be assumed, from which the equation may be most easily derived, or may be of the most simple form.

The three *conic sections* are of the second order, as their equations are universally quadratic; the *cissoïd* of the ancients is of the third order, and the 42d species, according to Sir Isaac Newton's enumeration; this is the curve defined by the equation in page 439, col. 1. par. ult. when $b=0$. The curve delineated above in the same page, is the 41st species. When b is negative in that equation, the locus is the 43d species. The *ctonchoid* of Nicomedes is of the fourth order; the *Cassinian* curve is also of the fourth order, &c.

It is to be observed, that not only the first definition of a curve may be expressed by an equation, but likewise any of those theorems called *loci*, in which some property is demonstrated to belong to every point of the curve. The expression of these propositions by equations, is sometimes difficult; no general rules can be given; and it must be left to the skill and experience of the learner.

Scholium.

This method of treating curve lines by equations, besides the uses already hinted at, has many others, which do not belong to this place; such are, the finding the tangents of curves, their curvature, their areas, and lengths, &c. The solution of these problems has been accomplished by means of the equations to curves, though by employing, concerning them, a method of reasoning different from what has been here explained.

C H A P. III.

I. Construction of the Loci of Equations.

THE description of a curve, according to the definition of it, is assumed in geometry as a *postulate*.

If the properties of a particular curve are investigated, it will appear that it may be described from a

N^o 11.

variety of data different from those assumed in the postulate, by demonstrating the dependence of the former upon the latter.

Application
to Geome-
try.

As the definitions of a curve may be various, so also may be the postulates, and a definition is frequently chosen from the mode of description connected with it. The particular object in view, it was formerly remarked, must determine the proper choice of a definition; the simplicity of it, the ease with which the other properties of the figure may be derived from it, and sometimes even the ease with which it can be executed mechanically, may be considered as important circumstances.

In the straight line, the circle, the conic sections, and a few curves of the higher orders, the most convenient definitions, and the postulates connected with them, are generally known and received. An equation to a curve may also be assumed as a definition of it; and the description of it, according to that definition, may be considered as a postulate: but if the geometrical construction of problems is to be investigated by means of algebra, it is often useful to deduce from the equation to a curve, those data which, from the geometrical theory of the curve, are known to be necessary to its description in the original postulate, or in any problem founded upon it. This is called *constructing the locus* of an equation, and from this method are generally derived the most elegant constructions which can be obtained by the use of algebra. In the following section, there is an example of a problem resolved by such constructions.

Sometimes a mechanical description of a curve line defined by an equation is useful; and as the exhibition of it, by such a motion as is supposed in that definition, is rarely practicable, it generally becomes necessary to contrive some more simple motion which may in effect correspond with the other, and may describe the curve with the degree of accuracy which is wanted. Frequently, indeed, the only method which can be conveniently practised, is the finding a number of points in the curve by the resolution of numeral equations, in the manner mentioned in Sect. 1. of this Chapter, and then joining these points by the hand; and though this operation is manifestly imperfect, it is on some occasions useful.

II. Solution of Problems.

The solution of geometrical problems by algebra is much promoted, by describing the loci of the equations arising from these problems.

For this purpose, equations are to be derived, according to the methods formerly described, and then to be reduced to two, containing each the same two unknown quantities. The loci of these equations are to be described, the two unknown quantities being considered as the co-ordinates, and placed at the same angle in both. The co-ordinates at an intersection of the loci, will be common to both, and give a solution of the problem.

The simplicity of a construction obtained by this method, will depend upon a proper notation, and the choice of the equations of which the loci are to be described. These will frequently be different from what would be proper in a different method of solution.

PROB.

Application
to Geo-
metry.

PROB. IV. To find a Point F in the Base of the given Triangle ABC , so that the Sum of the Squares of FE , FD drawn from it perpendicular upon the two Sides, may be equal to a given Space.

Draw BH , CG perpendicular on the two sides, and let $FD = x$, $FE = y$, $BF = z$, $BC = b$, $BH = p$, $CG = r$, and the given space $FD^2 + FE^2 = m^2$.

From similar triangles $z : x :: b : r$

and $z = \frac{bx}{r}$.

Also $b - z : y :: b : p$,

and $z = b - \frac{by}{p}$;

therefore $\frac{bx}{r} = b - \frac{by}{p}$.

That is $y = p - \frac{px}{r}$, an equation to a straight line.

But $x^2 + y^2 = m^2$ of which the locus is a circle, having m for the radius. By constructing these loci, their intersection will give a solution of the problem.

Let $KL = CG (=r)$ be at right angles to $LM = BH (=p)$, join KM , to which let LN be parallel; LN is the locus of the equation $y = p - \frac{px}{r}$; for let any line OPQ be drawn parallel to LM , if $KP = x$, then $PQ = \frac{px}{r}$, and $QO = LM = p$, therefore $PO = y = p - \frac{px}{r}$.

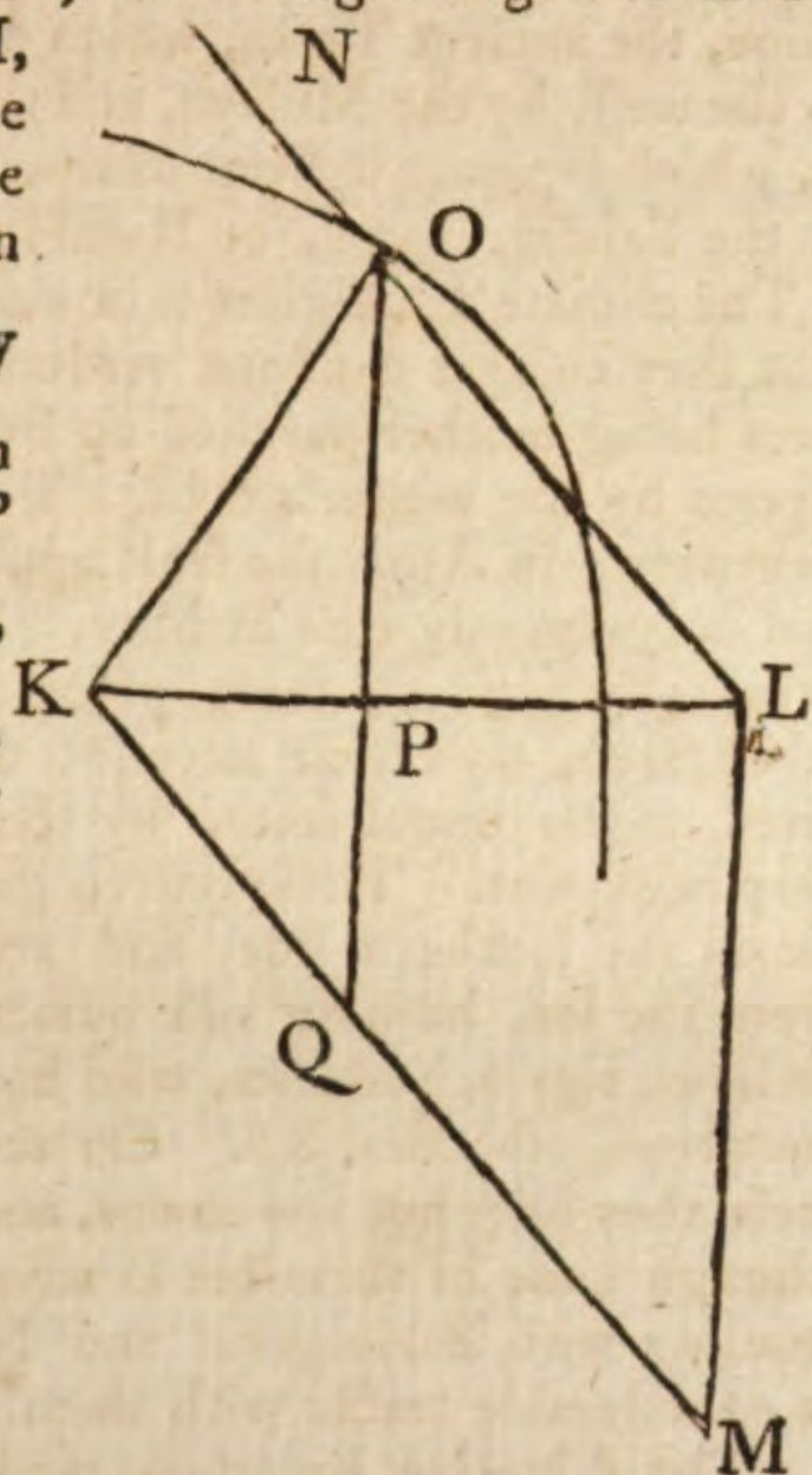
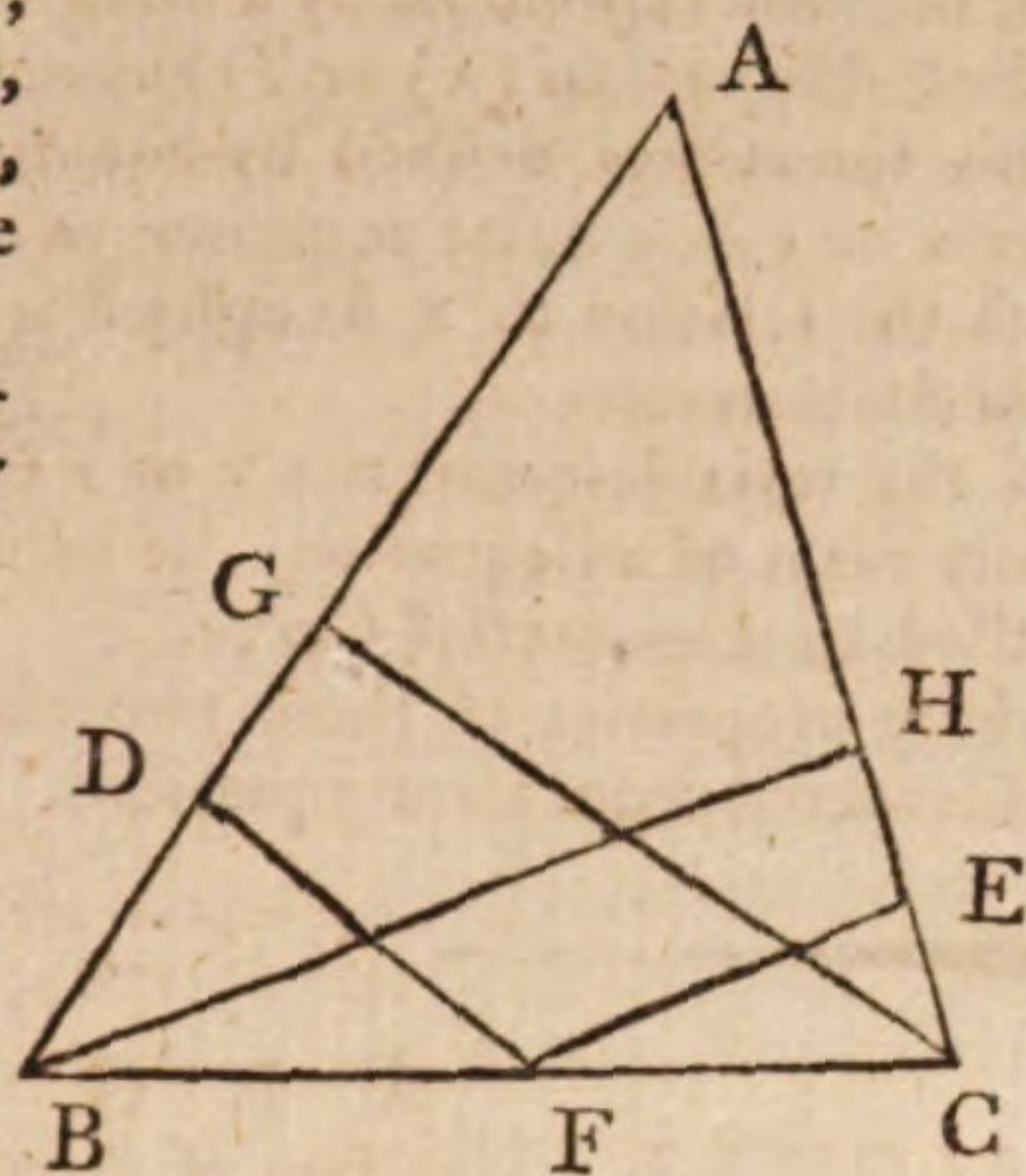
About the centre K , with a distance equal to the line m , let a circle be described; that circle will be the locus of the equation $m^2 = x^2 + y^2$; for it is plain that if OP be

any perpendicular from the circumference upon KL , KP being x , OP will be y . Either of the points, therefore, in which these two loci intersect each other, as O , will give OP an ordinate in both equations, KP being the common absciss; therefore KP , OP are the two perpendiculars required, from which the point F is easily found.

The construction might have been made on figure 1st, with fewer lines. If the circle touches LN , there is only one solution which is a minimum; and if the circle does not meet LN , the problem becomes impossible.

When the circle touches LN , the radius m must be equal to the perpendicular from K on LN , or from L

VOL. I. Part II.



on KM . This perpendicular is equal to $\frac{pr}{\sqrt{p^2 + r^2}}$ or a fourth proportional to MK , KL , and LM , and its square therefore is the least sum of the squares of the perpendiculars from a point in the base on the two sides.

It may be remarked also, that the point which gives the sum of the squares a minimum, is found by dividing the base, in the proportion of the squares of the two sides of the triangle; and this is easily demonstrated from the preceding construction.

PROB. V. Between two given Lines to find two mean Proportionals.

Let the lines be a and b , and let the two means be x and y ; therefore $a : x :: x : y :: y : b$, and hence $ay = x^2$, and $bx = y^2$, which are both equations to the parabola, and are easily constructed. The co-ordinates at the intersection of these two loci will be the means required.

If one unknown quantity only is assumed, or if it is convenient to deduce a final equation containing only one, the construction of the roots is to be obtained by the method mentioned in the next section.

Scholium.

The constructions of the two preceding problems are geometrical; but it is sometimes convenient to have a practical solution, by the mechanical description either of the algebraical lines employed in the geometrical solution, or of other geometrical lines by which it can be effected. But few of these are tolerably accurate; so that, in general, by means of calculation, the practical operations are all reduced to what may be performed by a rule and a compass.

III. Construction of Equations.

The roots of an equation, containing only one unknown quantity, may be found by the intersection of lines, the product of whose dimensions is equal to the dimension of that equation. And hence problems are resolved without an algebraical solution of the equation arising from them.

Thus cubic and biquadratic equations may be constructed by the intersections of two conic sections as the circle and parabola, which are generally assumed as being most easily described.

In order to find these constructions, a new equation is to be assumed, containing two variable quantities, one of which is the unknown quantity of the given equation, and the other by substitution is to be inserted also in the given equation; the intersection of the loci of these equations will exhibit the roots required.

Canons may be devised for the construction of particular orders, without assuming the new equation.

The final equation from prob. 5. would be $x^3 = a^2b$, which being constructed according to the rules, exhibits the common geometrical solution of that problem by the circle and parabola.

If an equation be assumed, as $ay = x^2$, the other by substitution becomes $xy = ab$; the locus of the former is a parabola, and of the latter an hyperbola, one of its asymptotes being the base, and the co-ordinates at their intersection will represent x and y ; the first of the two means is x , and in this case y is the other.

3 K

Equa-

Application
to Geo-
metry.

Application
to Geo-
metry.

Equations also might be assumed so as to give a solution of this problem by other combinations of two of the conic sections, one of them not being the circle.

As geometrical magnitudes may be represented by algebra, so algebraical quantities and numbers may be represented by lines. Hence this construction of equations has sometimes been used as an easy method of approximation to the roots of numeral equations. For this purpose, the necessary straight lines must be laid down by means of a scale of equal parts, and the curve lines, on whose intersection the construction depends, must be actually described; the linear roots being measured on the scale will give the numbers required. These operations may be performed with sufficient accuracy for certain purposes; but as they depend on mechanical principles, the approximation obtained by them cannot be continued at pleasure; and hence it is

seldom used, except in finding the first step of an approximation, which is to be carried on by other methods.

Application
to Geo-
metry.

Scholium.

If the relation between the ordinate and absciss be fixed, but not expressible by a finite equation, the curve is called *Mechanical* (A) or *Transcendental*. This class is also sometimes defined by equations, by supposing either x or y in a finite equation to be a curve line, of which the relation to a straight line cannot be expressed in finite terms.

If the variable quantities x or y enter the exponents of any term of an equation, the locus of that equation is called an *Exponential Curve*.

Many properties of these two classes of curves may be discovered from their equations.

A L G

Algedo
||
Algiabarii.

ALGEDO, the running of a gonorrhœa stopping suddenly after it appears. When it thus stops, a pain reaches to the anus, or to the testicles, without their being swelled; and sometimes this pain reaches to the bladder; in which case there is an urging to discharge the urine, which is with difficulty passed, and in very small quantities at a time. The pain is continued to the bladder by the urethra; to the anus, by the acceleratory muscles of the penis; and to the testicles, by the vasa deferentia, and vesiculæ seminales. In this case, calomel repeated so as to purge, brings back the running, and then all difficulty from this symptom ceases.

ALGENEB, a fixed star, of the second magnitude, in Perseus's right side; its longitude is $27^{\circ} 46' 12''$ of Taurus, and its latitude $30^{\circ} 05' 28''$ north, according to Mr Flamsteed's catalogue.

ALGEZIRA, a town of Andalusia in Spain, with a port on the coast of the Straits of Gibraltar. By this city the Moors entered Spain in 713; and it was taken from them in 1344, after a very long siege, remarkable for being the first in which cannon were made use of. It was called *Old Gibraltar*, and is about four leagues from the New. W. Long. 5. 2. N. Lat. $36. 0.$

ALGHIER, or **ALGERI**, a town in Sardinia, with a bishop's see, upon the western coast of the island, between Safferi and Bosa. Though it is not large, it is well peopled, and has a commodious port. The coral fished for on this coast is in the highest esteem of any in the Mediterranean. W. Long. 4. 2. Lat. $36. 0.$

ALGIABARII, a Mahometan sect of predestinarians, who attribute all the actions of men, good or evil, to the agency or influence of God. The Algiabarii stand opposed to the **ALKADARII**. They hold absolute degrees and physical premotion. For the justice of God in punishing the evil he has caused, they resolve it wholly into his absolute dominion over the creatures.

A L G

ALGIERS, a kingdom of Africa, now one of the states of Barbary.—According to the latest and best computations, it extends 460 miles in length from east to west, and is very unequal in breadth; some places being scarce 40 miles broad, and others upwards of 100. It lies between Long. $0. 16.$ and $9. 16. W.$ and extends from Lat. $36. 55.$ to $44. 50. N.$ —It is bounded on the north, by the Mediterranean; on the east, by the river Zaine, the ancient Tusca, which divides it from Tunis; on the west, by the Mulvya, and the mountains of Trava, which separate it from Morocco; and on the south by the Sahara, Zaara, or Numidian desert.

The climate of Algiers is in most places so moderate, that they enjoy a constant verdure; the leaves of the trees being neither parched up by heat in summer, nor nipped by the winter's cold. They begin to bud in February; in April the fruit appears in its full bigness, and is commonly ripe in May. The soil, however, is excessively various; some places being very hot, dry, and barren, on which account they are generally suffered to lie uncultivated by the inhabitants, who are very negligent. These barren places, especially such as lie on the southern side, and are at a great distance from the sea, harbour vast numbers of wild creatures, as lions, tigers, buffaloes, wild boars, stags, porcupines, monkeys, ostriches, &c. On account of their barrenness, they have but few towns, and those thinly peopled; though some of them are so advantageously situated for trading with Bildulgerid and Negroland, as to drive a considerable traffic with them.

The Algerine kingdom made formerly a considerable part of the Mauritania Tingitana (See **MAURITANIA**), which was reduced to a Roman province by Julius Cæsar, and from him also called *Mauritania Cæsariensis*.—In the general account of Africa, it has been noticed, that the Romans were driven out of that continent by the Vandals; these by Belisarius, the Greek emperor Justinian's general; and the Greeks in their turn by the Saracens. This last revolution happened

(A) The term *Mechanical*, in this place, is used merely as the name of a particular class of curves, without implying that they have any more dependence on the principles of Mechanics or Physics than the algebraical curves which have been treated of.

¹ **Algiers.** happened about the middle of the seventh century; and the Arabs continued masters of the country, divided into a great number of petty kingdoms or states; under chiefs of their own choosing, till the year 1051.

² **Abu-Textefien** subdued the Arab princes. This year, one Abubeker-ben-Omar, or, as the Spanish authors call him, *Abu-Textefien*, an Arab of the Zinhagian tribe, being provoked at the tyranny of those despots, gathered, by the help of his marabouts or saints, a most powerful army of malcontents, in the southern provinces of Numidia and Libya. His followers were nicknamed *Marabites* or *Morabites*; by the Spaniards, *Almoravides*; probably from their being assembled principally by the saints who were also called *Morabites*. The khalif of Kayem's forces were at this time taken up with quelling other revolts in Syria, Mesopotamia, &c. and the Arabs in Spain engaged in the most bloody wars; so that Textefien having nothing to fear from them, had all the success he could wish against the Arabian cheyks or petty tyrants, whom he defeated in many battles, and at last drove them not only out of Numidia and Libya, but out of all the western parts, reducing the whole province of Tingitania under his dominion.

Textefien was succeeded by his son Yusef, or Joseph a brave and warlike prince. In the beginning of his reign, he laid the foundation of the city of Morocco, which he designed to make the capital of his empire. While that city was building, he sent some of his marabouts ambassadors to Tremecen (now a province of Algiers), at that time inhabited by a powerful and insolent sect of Mahometans called *Zeneti*. The design of this embassy was to bring them back to what he called the *true faith*; but the *Zeneti*, despising his offers, assembled at Amas, or Amfa, their capital, murdered the ambassadors, and invaded Joseph's dominions with an army of 50,000 men.

³ **Zeneti destroyed.** The king hearing of their infamous proceedings, speedily mustered his army, and led it by long marches into their country, destroying all with fire and sword; while the *Zeneti*, instead of opposing his progress, retired as fast as possible towards Fez, in hopes of receiving assistance from thence. In this they were miserably deceived: the Fezzans marched out against them in a hostile manner; and coming up with the unhappy *Zeneti*, encumbered with their families and baggage, and ready to expire with hunger and weariness, they cut them all to pieces, except a small number who were mostly drowned in attempting to swim across a river, and some others who in their flight perished by falling from the high adjacent rocks. In the mean time Joseph reduced their country to a mere desert: which was, however, soon peopled by a numerous colony of Fezzans, who settled there under the protection of the reigning kings. In this war it is computed that near a million of the *Zeneti*, men, women, and children, lost their lives.

The restless and ambitious temper of Joseph did not let him remain long at peace. He quickly declared war against the Fezzans, reduced them to become his tributaries, and extended his conquests all along the Mediterranean. He next attacked some Arabian cheyks who had not yet submitted to his jurisdiction; and pursued them with such fury, that neither the Libyan deserts, nor ridges of the most craggy rocks, could shelter them from his arms. He attacked them in such of

their retreats, castles, and fortresses, as were till then deemed impregnable; and at last subdued them, to the great grief of the other African nations, who were greatly annoyed by the ravages committed by his numerous forces.

Thus was founded the empire of the *Morabites*: which, however, was of no long duration; that race being in the 12th century driven out by Mohavedin, a marabout. This race of priests was expelled by Abdulac governor of Fez; and he, in the 13th century, stripped of his new conquests by the Sharifs of *Hascen*, the descendants of Sharifs of those Arabian princes whom Abu-Textefien had formerly expelled. ⁴ who.

The better to secure their new dominions, the Sharifs divided them into several little kingdoms or provinces; and among the rest the present kingdom of Algiers was divided into four, namely, *Tremecen*, *Tenez*, *Algiers proper*, and *Bujeyah*. The four first monarchs laid so good a foundation for a lasting balance of power between their little kingdoms, that they continued for some centuries in mutual peace and amity; but at length the king of Tremecen having ventured to violate some of their articles, Abul-Farez, king of Tenez, declared war against him, and obliged him to become his tributary. This king dying soon after, and having divided his kingdom among his three sons, new discords arose; which Spain taking advantage of, a powerful fleet and army was sent against Barbary, under the count of Navarre, in 1505. This commander ⁵ soon made himself master of the important cities of *Oran*, *Bujeyah*, and some others; which so alarmed the Algerines, that they put themselves under the protection of Selim Eutemi, a noble and warlike Arabian prince. He came to their assistance with a great number of his bravest subjects, bringing with him his wife Zaphira, and a son then about 12 years old. This however was not sufficient to prevent the Spaniards from landing a number of forces near Algiers that same year, and obliging that metropolis to become tributary to Spain. Nor could Prince Selim hinder them from building a strong fort on a small island opposite to the city, which terrified their corsairs from sailing either in or out of the harbour.

To this galling yoke the Algerines were obliged to submit till the year 1516; when, hearing of the death of Ferdinand king of Spain, they sent an embassy to *Aruch Barbarossa*, who was at this time no less dreaded for his valour than his surprising success, and was ⁶ then sent on a cruise with a squadron of galleys and barks. The purport of the embassy was, that he should come and free them from the Spanish yoke; for which they agreed to pay him a gratuity answerable to so great a service. Upon this Barbarossa immediately dispatched 18 galleys and 30 barks to the assistance of the Algerines; while he himself advanced towards the city with 800 Turks, 3000 Jigelites, and 2000 Moorish volunteers. Instead of taking the nearest road to Algiers, he directed his course towards *Sharshel*, where *Hassan*, another famed corsair, had settled himself. Him he surprised, and obliged to surrender; not without a previous promise of friendship: but no sooner had Barbarossa got him in his power, than he cut off his head; and obliged all Hassan's Turks to follow him in his new expedition.

On Barbarossa's approach to Algiers, he was met by ³ K 2 prince

Algiers.
His treach-
ery and
cruelty.

prince Eutemi, attended by all the people of that metropolis, great and small; who looked for deliverance from this abandoned villain, whom they accounted invincible. He was conducted into the city amidst the acclamations of the people, and lodged in one of the noblest apartments of prince Eutemi's palace, where he was treated with the greatest marks of distinction. Elated beyond measure with this kind reception, Barbarossa formed a design of becoming king of Algiers; and fearing some opposition from the inhabitants, on account of the excesses he suffered his soldiers to commit, murdered prince Eutemi, and caused himself to be proclaimed king; his Turks and Moors crying out as he rode along the streets, "Long live King Aruch Barbarossa, the invincible king of Algiers, the *chosen of God* to deliver the people from the oppression of the Christians; and destruction to all that shall oppose, or refuse to own him as their lawful sovereign." These last threatening words so intimidated the inhabitants, already apprehensive of a general massacre, that he was immediately acknowledged king. The unhappy princess Zaphira, it is said, poisoned herself, to avoid the brutality of this new king, whom she unsuccessfully endeavoured to stab with a dagger.

Barbarossa was no sooner seated on the throne, than he treated his subjects with such cruelty, that they used to shut up their houses and hide themselves when he appeared in public. In consequence of this, a plot was soon formed against him; but being discovered, he caused twenty of the principal conspirators to be beheaded, their bodies to be buried in a dunghill, and laid a heavy fine on those who survived. This so terrified the Algerines, that they never afterwards durst attempt any thing against either Barbarossa or his successors.

In the mean time, the son of prince Eutemi having fled to Oran, and put himself under the protection of the marquis of Gomarez, laid before that nobleman a plan for putting the city of Algiers into the hands of the king of Spain. Upon this, young Selim Eutemi was sent to Spain, to lay his plan before cardinal Ximenes; who having approved of it, sent a fleet with 10,000 land forces, under the command of *Don Francisco*, or, as others call him, *Don Diego de Vera*, to drive out the Turks, and restore the young prince. But the fleet was no sooner come within sight of land, than it was dispersed by a storm, and the greatest part of the ships dashed against the rocks. Most of the Spaniards were drowned; and the few who escaped to shore were either killed by the Turks or made slaves.

Though Barbarossa had nothing to boast on this occasion, his pride and insolence were now swelled to such a degree, that he imagined himself invincible, and that the very elements conspired to make him so. The Arabians were so much alarmed at his success, that they implored the assistance of Hamidel Abdes king of Tenez, to drive the Turks out of Algiers. That prince readily undertook to do what was in his power for this purpose, provided they agreed to settle the kingdom on himself and his descendants. This proposal being accepted, he immediately set out at the head of 10,000 Moors; and, upon his entering the Algerine dominions, was joined by all the Arabians in the country. Barbarossa engaged him only with 1000 Turkish musqueteers and 500 Granada Moors; totally defeated his numerous army; pursued him to the very gates of his

capital, which he easily made himself master of; and, having given it up to be plundered by his Turks, obliged the inhabitants to acknowledge him as their sovereign. This victory, however, was chiefly owing to the advantage which his troops had from their fire-arms; the enemy having no other weapons than arrows and javelins.

No sooner was Barbarossa become master of the kingdom of Tenez, than he received an embassy from the inhabitants of Tremecen; inviting him to come to their assistance against their then reigning prince, with whom they were dissatisfied on account of his having dethroned his nephew, and forced him to fly to Oran; offering him even the sovereignty, in case he accepted of their proposal. The king of Tremecen, not suspecting the treachery of his subjects, met the tyrant with an army of 6000 horse and 3000 foot: but Barbarossa's artillery gave him such an advantage, that the king was at length forced to retire into the capital; which he had no sooner entered, than his head was cut off, and sent to Barbarossa, with a fresh invitation to come and take possession of the kingdom. On his approach, he was met by the inhabitants, whom he received with great complaisance, and many fair promises; but beginning to tyrannize as usual, his new subjects soon convinced him that they were not so passive as the inhabitants of Algiers. Apprehending, therefore, that his reign might prove uneasy and precarious, he entered into an alliance with the king of Fez; after which, he took care to secure the rest of the cities in his new kingdom, by garrisoning them with his own troops. Some of these, however, revolted soon after; upon which he sent one of his corsairs, named *Escander*, a man no less cruel than himself, to reduce them. The Tremecenians now began to repent in good earnest of their having invited such a tyrant to their assistance; and held consultations on the most proper means of driving them away, and bringing back their lawful prince *Abuchen Men*: but their cabals being discovered, a great number of the conspirators were massacred in the most cruel manner. The prince had the good luck to escape to Oran, and was taken under the protection of the marquis of Gomarez, who sent immediate advice of it to Charles V. then lately arrived in Spain, with a powerful fleet and army. That monarch immediately ordered the young king a succour of 10,000 men, under the command of the governor of Oran; who, under the guidance of *Abuchen Men*, began his march towards Tremecen; and in their way they were joined by prince Selim, with a great number of Arabs and Moors. The first thing they resolved upon was, to attack the important fortrefs of *Calau*, situated between Tremecen and Algiers, and commanded by the corsair *Escander* at the head of about 300 Turks. They invested it closely on all sides, in hopes Barbarossa would come out of Tremecen to its relief, which would give the Tremecenians an opportunity of keeping him out. That tyrant, however, kept close in his capital, being embarrassed by his fears of a revolt, and the politic delays of the king of Fez, who had not sent the auxiliaries he promised. The garrison of *Calau*, in the mean time, made a brave defence; and, in a sally they made at night, cut off near 300 Spaniards. This encouraged them to venture a second time; but they were now repulsed with great loss, and *Escander* himself wounded;

soon

Algiers. soon after which, they surrendered upon honourable terms; but were all massacred by the Arabians, except 16, who clung close to the stirrups of the king, and of the Spanish general.

Barbarossa being now informed that Abuchen Men, with his Arabs, accompanied by the Spaniards, were in full march to lay siege to Tremecen, thought proper to come out, at the head of 1500 Turks and 5000 Moorish horse, in order to break his way through the enemy; but he had not proceeded far from the city, before his council advised him to return and fortify himself in it. This advice was now too late; the inhabitants being resolved to keep him out, and open their gates to their own lawful prince as soon as he appeared. In this distress Barbarossa saw no way left but to retire to the citadel, and there defend himself till he could find an opportunity of stealing out with his men and all his treasure. Here he defended himself vigorously; but his provisions failing him, he took advantage of a subterraneous back-way, which he had caused to be digged up for that purpose, and, taking his immense treasure with him, stole away as secretly as he could. His flight, however, was soon discovered; and he was so closely pursued, that to amuse, as he hoped, the enemy, he caused a great deal of his money, plate, jewels, &c. to be scattered all the way, thinking they would not fail to stop their pursuit to gather it up. This stratagem, however, failed, through the vigilance of the Spanish commander, who being himself at the head of the pursuers, obliged them to march on, till he was come up close to him on the banks of the *Huexda*, about eight leagues from Tremecen. Barbarossa had just crossed the river with his vanguard, when the Spaniards came up with his rear on the other side, and cut them all off; and then crossing the water, overtook him at a small distance from it. Here a bloody engagement ensued, in which the Turks fought like as many lions; but, being at length overpowered by numbers, they were all cut to pieces, and Barbarossa among the rest, in the 44th year of his age, and four years after he had raised himself to the royal title of *Jigel* and the adjacent country; two years after he had acquired the sovereignty of Algiers, and scarce a twelvemonth after the reduction of Tremecen. His head was carried to Tremecen, on the point of a spear; and Abuchen Men proclaimed king, to the joy of all the inhabitants. A few days after the fight, the king of Fez made his appearance at the head of 20,000 horse, near the field of battle; but hearing of Barbarossa's defeat and death, marched off with all possible speed, to avoid being attacked by the enemy.

8. Barbarossa defeated and killed by the Spaniards.

9. Succeeded by Hayradin.

The news of Barbarossa's death spread the utmost consternation among the Turks at Algiers; however, they caused his brother Hayradin to be immediately proclaimed king. The Spanish commander now sent back the emperor's forces, without making any attempt upon Algiers; by which he lost the opportunity of driving the Turks out of that country; while Hayradin, justly dreading the consequences of the tyranny of his officers, sought the protection of the Grand Signior. This was readily granted, and himself appointed bashaw or viceroy of Algiers; by which means he received such considerable reinforcements, that the unhappy Algerines durst not make the least complaint: and such numbers of Turks resorted to him, that he

was not only capable of keeping the Moors and Arabs in subjection at home, but of annoying the Christians at sea. His first step was to take the Spanish fort abovementioned, which was a great nuisance to his metropolis. The Spaniards held out to the last extremity; but being all slain or wounded, Hayradin easily became master of the place.

Hayradin next set about building a strong mole for the safety of his ships. In this he employed 30,000 Christian slaves, whom he obliged to work without intermission for three years; in which time the work was completed. He then caused the fort he had taken from the Spaniards to be repaired, and placed a strong garrison in it, to prevent any foreign vessels from entering the harbour without giving an account of themselves. By these two important works, Hayradin soon became dreaded not only by the Arabs and Moors, but also by the maritime Christian powers, especially the Spaniards. The viceroy failed not to acquaint the Grand Signior with his success, and obtained from him a fresh supply of money, by which he was enabled to build a stronger fort, and to erect batteries on all places that might favour the landing of an enemy. All these have since received greater improvements from time to time, as often as there was occasion for them.

In the mean time the Sultan, either out of a sense of the great services Hayradin had done, or perhaps out of jealousy lest he should make himself independent, raised Hayradin to the dignity of bashaw of the empire, and appointed Hassan Aga, a Sardinian renegade, an intrepid warrior, and an experienced officer, to succeed him as bashaw of Algiers. Hassan had no sooner taken possession of his new government, than he began to pursue his ravages on the Spanish coast with greater fury than ever; extending them to the ecclesiastical state, and other parts of Italy. But Pope Paul III. being alarmed at this, exhorted the emperor Charles V. to send a powerful fleet to suppress those frequent and cruel piracies; and, that nothing might be wanting to render the enterprise successful, a bull was published by his holiness, wherein a plenary absolution of sins, and the crown of martyrdom, was promised to all those who either fell in battle or were made slaves; the emperor on his part needed no spur; and therefore set sail at the head of a powerful fleet consisting of 120 ships and 20 galleys, having on board 30,000 chosen troops, an immense quantity of money, arms, ammunition, &c. In this expedition many young nobility and gentry attended as volunteers, and among these many knights of Malta, so remarkable for their valour against the enemies of Christianity. Even ladies of birth and character attended Charles in his expedition, and the wives and daughters of the officers and soldiers followed them with a design to settle in Barbary after the conquest was finished. All these meeting with a favourable wind, soon appeared before Algiers; every ship displaying the Spanish colours on the stern, and another at the head, with a crucifix to serve them for a pilot.

By this prodigious armament, the Algerines were thrown into the utmost consternation. The city was surrounded only by a wall with scarce any outworks. The whole garrison consisted of 800 Turks and 6000 Moors, without fire-arms, and poorly disciplined and accoutred; the rest of their forces being dispersed in the

Algiers.

10. He takes the Spanish fort.

11. Succeeded by Hassan Aga.

12. Charles Vth's expedition against Algiers.

13. Algiers in great consternation.

Algiers.

the other provinces of the kingdom, to levy the usual tribute on the Arabs and Moors. The Spaniards landed without opposition, and immediately built a fort, under the cannon of which they encamped, and diverted the course of a spring which supplied the city with water. Being now reduced to the utmost distress, Hassan received a summons to surrender at discretion, on pain of being put to the sword with all the garrison. The herald was ordered to extol the vast power of the emperor both by sea and land, and to exhort him to return to the Christian religion. But to this Hassan only replied, that he must be a madman who would pretend to advise an enemy, and that the adviser must still act more madly who would take counsel of such an adviser. He was, however, on the point of surrendering the city, when advice was brought him that the forces belonging to the western government were in full march towards the place; upon which it was resolved to defend it to the utmost. Charles, in the mean time, resolving upon a general assault, kept a constant firing upon the town; which, from the weak defence made by the garrison, he looked upon as already in his hands. But while the *douwan*, or Algerine senate, were deliberating on the most proper means of obtaining an honourable capitulation, a mad prophet, attended by a multitude of people, entered the assembly, and foretold the speedy destruction of the Spaniards before the end of the moon, exhorting the inhabitants to hold out till that time. This prediction was soon accomplished in a very surprising and unexpected manner: for, on the 28th of October 1541, a dreadful storm of wind, rain, and hail, arose from the north, accompanied with violent shocks of earthquakes, and a dismal and universal darkness both by sea and land; so that the sun, moon, and elements, seemed to combine together for the destruction of the Spaniards. In that one night, some say in less than half an hour, 86 ships and 15 galleys were destroyed, with all their crews and military stores; by which the army on shore was deprived of all means of subsisting in these parts. Their camp also, which spread itself along the plain under the fort, was laid quite under water by the torrents which descended from the neighbouring hills. Many of the troops, by trying to remove into some better situation, were cut in pieces by the Moors and Arabs; while several galleys, and other vessels, endeavouring to gain some neighbouring creeks along the coasts, were immediately plundered, and their crews massacred by the inhabitants.

The next morning Charles beheld the sea covered with the fragments of so many ships, and the bodies of men, horses, and other creatures, swimming on the waves; at which he was so disheartened, that abandoning his tents, artillery, and all his heavy baggage, to the enemy, he marched at the head of his army, though in no small disorder, towards cape *Malabux*, in order to reembark in those few vessels which had outweathered the storm. But Hassan, who had caused his motions to be watched, allowed him just time to get to the shore, when he sallied out and attacked the Spaniards in the midst of their hurry and confusion to get into their ships, killing great numbers, and bringing away a still greater number of captives; after which he returned in triumph to Algiers, where he celebrated with great rejoicings his happy deliverance from such distress and danger.

14
Prevented
by a mad
prophet
from sur-
rendering.

15
Spanish
fleet de-
stroyed by
a storm.

16
Siege of Al-
giers raised.

Soon after this, the prophet *Yusef*, who had foretold the destruction of the Spaniards, was not only declared the deliverer of his country, but had a considerable gratuity decreed him, with the liberty of exercising his prophetic function unmolested. It was not long, however, before the marabouts, and some interpreters of the law, made a strong opposition against him; remonstrating to the bashaw, how ridiculous and scandalous it was to their nation, to ascribe the deliverance of it to a poor fortune-teller, which had been obtained by the fervent prayers of an eminent saint of their own profession. But though the bashaw and his *douwan* seemed, out of policy, to give into this last notion, yet the impression which Yusef's predictions and their late accomplishments had made upon the minds of the common people, proved too strong to be eradicated; and the spirit of divination and conjuring has since got into such credit among them, that not only their great statesmen, but their priests, marabouts, and *santouns*, have applied themselves to that study, and dignified it with the name of *Mahomet's revelations*.

Algiers.

17
The mad
prophet re-
warded.

The unhappy Spaniards had scarce reached their ships, when they were attacked by a fresh storm, in which several more of them perished; one ship in particular, containing 700 soldiers, besides sailors, sunk in the emperor's sight, without a possibility of saving a single man. At length, with much labour, they reached the port of *Bujeyah*, at that time possessed by the Spaniards, whither Hassan king of Tunis soon after repaired, with a supply of provisions for the emperor, who received him graciously, with fresh assurances of his favour and protection. Here he dismissed the few remains of the Maltese knights and their forces, who embarked in three shattered galleys, and with much difficulty and danger reached their own country. Charles himself staid no longer than till the 16th of November, when he set sail for Carthage, and reached it on the 25th of the same month. In this unfortunate expedition upwards of 120 ships and galleys were lost, above 300 colonels and other land and sea officers, 8000 soldiers and marines, besides those destroyed by the enemy on the reembarkation, or drowned in the last storm. The number of prisoners was so great, that the Algerines sold some of them, by way of contempt, for an onion per head.

18
Fresh cala-
mities of the
Spaniards.

Hassan, elated with this victory, in which he had very little share, undertook an expedition against the king of Tremecen, who, being now deprived of the assistance of the Spaniards, was forced to procure a peace by paying a vast sum of money, and becoming tributary to him. The bashaw returned to Algiers, laden with riches; and soon after died of a fever, in the 66th year of his age.

19
Hassan re-
duces Tre-
mecen.

From this time the Spaniards were never able to annoy the Algerines in any considerable degree. In 1555, they lost the city of *Bujeyah*, which was taken by *Salba Rais*, Hassan's successor; who next year set out on a new expedition, which he kept a secret, but was suspected to be intended against Oran: but he was scarcely got four leagues from Algiers, when the plague, which at that time raged violently in the city, broke out in his groin, and carried him off in 24 hours.

20
Bujeyah ta-
ken from
the Spani-
ards.

Immediately after his death the Algerine soldiery chose a Corsican renegado, Hassan Corso, in his room, till they should receive farther orders from the Porte.

21
Hassan Cor-
so chosen
bashaw by
the Jani-
saries.
He

Algiers. He did not accept of the bashawship without a good deal of difficulty; but immediately prosecuted the intended expedition against Oran, dispatching a messenger to acquaint the Porte with what had happened. They had hardly begun their hostilities against the place, when orders came from the Porte, expressly forbidding Hassan Corso to begin the siege, or, if he had begun it, enjoining him to raise it immediately. This news was received with great grief by the whole fleet and army, as they thought themselves sure of success, the garrison being at that time very weak. Nevertheless, as they dared not disobey, the siege was immediately raised.

²² **Superfeded by Tekelli,** Corso had hardly enjoyed his dignity four months, before news came, that eight galleys were bringing a new bashaw to succeed him; one *Tekelli*, a principal Turk of the Grand Signior's court: upon which the Algerines unanimously resolved not to admit him. By the treachery of the Levantine soldiers, however, he was admitted at last, and the unfortunate Corso thrown over a wall in which a number of iron hooks were fixed; one of which catching the ribs of his right side, he hung three days in the most exquisite torture before he expired.

Tekelli was no sooner entered upon his new government, than he behaved with such cruelty and rapaciousness, that he was assassinated even under the dome of a saint, by Yusuf Calabres, the favourite renegado of Hassan Corso; who for this service was unanimously chosen bashaw, but died of the plague six days after his election.

²³ **Hassan re-** Yusuf was succeeded by Hassan the son of Hayradin, who had been formerly recalled from his bashawship, when he was succeeded by Selha-Rais; and now had the good fortune to get himself reinstated in his employment. Immediately on his arrival, he engaged in a war with the Arabs, by whom he was defeated with great loss. The next year, the Spaniards undertook an expedition against Mostagan, under the command of the count d'Alcandela; but were utterly defeated, the commander himself killed, and 12,000 taken prisoners. This disaster was owing to the inconsiderate rashness, or rather madness, of the commander; which was so great, that, after finding it impossible to rally his scattered forces, he rushed, sword in hand, into the thickest of the enemy's ranks, at the head of a small number of men, crying out, "St Jago! St Jago! the victory is ours, the enemy is defeated;" soon after which he was thrown from his horse, and trampled to death.

²⁵ **Hassan sent in irons to Constanti-** Hassan, having had the misfortune to disoblige his subjects by allowing the mountaineers of Cuco to buy ammunition at Algiers, was sent in irons to Constantinople, while the aga of the Janisaries, and general of the land forces, supplied his place.—Hassan easily found means to clear himself; but a new bashaw was appointed, called *Achmat*; who was no sooner arrived, than he sent the two deputy-bashaws to Constantinople, where their heads were struck off.—Achmet was a man of such insatiable avarice, that, upon his arrival at Algiers, all ranks of people came in shoals to make him presents; which he the more greedily accepted, as he had bought his dignity by the money he had amassed while head gardener to the Sultan. He enjoyed it, however, only four months; and after his death, the state was governed other four months by his lieutenant;

when Hassan was a third time sent viceroy to Algiers, where he was received with the greatest demonstrations of joy.

²⁶ **Reinstated.** The first enterprise in which Hassan engaged, was the siege of Marfalquiver, situated near the city Oran, which he designed to invest immediately after. The Marfalquiver. army employed in this siege consisted of 26,000 foot and 10,000 horse, besides which he had a fleet consisting of 32 galleys and galliots, together with three French vessels laden with biscuit, oil, and other provisions. The city was defended by Don Martin de Cordova, brother of the Count d'Alcandela, who had been taken prisoner in the battle where that nobleman was killed, but had obtained his liberty from the Algerines with immense sums, and now made a most gallant defence against the Turks. The city was attacked with the utmost fury by sea and land, so that several breaches were made in the walls. The Turkish standards were several times planted on the walls, and as often dislodged; but the place must have in the end submitted had not Hassan been obliged to raise the siege in haste, on the news that the famed Genoese admiral Doria was approaching with considerable succours from Italy. The fleet accordingly arrived soon after; but missing the Algerine galleys, bore away for Pennon de Valez, where they were shamefully repulsed by an handful of Turks who garrisoned that place; which, however, was taken the following year.

²⁸ **Hassan a-** In 1567, Hassan was again recalled to Constantinople, where he died three years after. He was succeeded by Mahomet, who gained the love of the Algerines by several public-spirited actions. He incorporated the Janisaries and Levantine Turks together, and by that means put an end to their dissensions, which laid the foundation of the Algerine independency on the Porte. He likewise added some considerable fortifications to the city and castle, which he designed to render impregnable. But while he was thus studying the interest of Algiers, one John Gascon, a bold Spanish adventurer, formed a design of surprising the whole piratic navy in the bay, and setting them on fire in the night-time, when they lay defenceless, and in their first sleep. For this he had not only the permission of king Philip II. but was furnished by him with proper vessels, mariners, and fireworks, for the execution of his plot. With these he set sail for Algiers in the most proper season, viz. the beginning of October, when most, if not all, the ships lay at anchor there; and easily sailed near enough, unsuspected, to view their manner of riding, in order to catch them napping, at a time when the greater part of their crew were dispersed in their quarters. He came accordingly, unperceived by any, to the very mole-gate, and dispersed his men with their fire-works; but to their great surprise, they found them so ill mixed, that they could not with all their art make them take fire. In the mean time, Gascon took it into his head, by way of bravado, to go to the mole-gate, and give three loud knocks at it with the pommel of his dagger, and to leave it fixed in the gate by its point, that the Algerines might have cause to remember him. This he had the good fortune to do without meeting with any disturbance or opposition; but it was not so with his men; for no sooner did they find their endeavours unsuccessful, than they made such a bustle as quickly alarmed the guard posted on the adjacent

³⁰ **His brave-**

Algiers.
31
Is taken
and put to
death.

jaçant bastion, from which the uproar quickly spread itself through the whole garrison. Gascon, now finding himself in the utmost danger, failed away with all possible haste: but he was pursued, overtaken, and brought back a prisoner to Mahomet; who no sooner got him into his power, than he immediately caused a gibbet of considerable height to be erected on the spot where Gascon had landed, ordering him to be hoisted up, and hung by the feet to a hook, that he might die in exquisite torture; and to show his resentment and contempt of the king his master, he ordered his commission to be tied to his toes. He had not, however, hung long in that state, when the captain who took him, accompanied by a number of other corsairs, interceded so strongly in his behalf, that he was taken down and put under the care of some Christian surgeons; but two days after, some Moors reporting that it was the common talk and belief in Spain, that the Algerines durst not hurt a hair of Gascon's head, &c. the unfortunate Spaniard was hoisted up by a pulley to the top of the execution-wall, and let down again upon the hook, which in his fall caught him by the belly, and gave him such a wound, that he expired without a groan.—Thus ended the expedition of John Gascon, which has procured him a place among the Spanish martyrs; while, on the other hand, the Algerines look upon his disappointment to have been miraculous, and owing to the efficacious protection of the powerful saint *Sidi Outeddedda*, whose prayers had before raised such a terrible storm against the Spanish fleet.

Mahomet, being soon after recalled, was succeeded by the famous renegado Ochali, who reduced the kingdom of Tunis; which, however, remained subject to the viceroy of Algiers only till the year 1586, when a bashaw of Tunis was appointed by the Porte.

The kingdom of Algiers continued to be governed, till the beginning of the seventeenth century, by viceroys or bashaws appointed by the Porte; concerning whom we find nothing very remarkable, further than that their avarice and tyranny was intolerable both to the Algerines and the Turks themselves. At last the Turkish Janisaries and militia becoming powerful enough to suppress the tyrannic sway of these bashaws, and the people being almost exhausted by the heavy taxes laid upon them, the former resolved to depose these petty tyrants, and set up some officers of their own at the head of the realm. The better to succeed in this attempt, the militia sent a deputation of some of their chief members to the Porte, to complain of the avarice and oppression of these bashaws, who sunk both the revenue of the state, and the money remitted to it from Constantinople, into their own coffers, which should have been employed in keeping up and paying the soldiery; by which means they were in continual danger of being overpowered by the Arabians and Moors, who, if ever so little assisted by any Christian power, would hardly fail of driving all the Turks out of the kingdom. They represented to the Grand Vizir how much more honourable, as well as easier and cheaper, it would be for the Grand Signior to permit them to choose their own dey or governor from among themselves, whose interest it would then be to see that the revenue of the kingdom was rightly applied in keeping up its forces complete, and in supplying all other exigencies of the state, without any farther charge

Nº 12.

or trouble to the Porte than that of allowing them its protection. On their part, they engaged always to acknowledge the Grand Signiors as their sovereigns, and to pay them their usual allegiance and tribute, to respect their bashaws, and even to lodge and maintain them and their retinue, in a manner suitable to their dignity, at their own charge. The bashaws, however were, for the future, to be excluded from assisting at any but general douwans, unless invited to it; and from having the liberty of voting in them, unless when their advice was asked, or the interest of the Porte was likely to suffer by their silence. All other concerns, which related to the government of Algiers, were to be wholly left under the direction of the dey and his douwan.

These proposals having been accepted by the Porte, the deputies returned highly satisfied; and having notified their new privileges, the great *douwan* immediately proceeded to the election of a dey from among themselves. They compiled a new set of laws, and made several regulations for the better support and maintenance of this new form of government, to the observation of which they obliged all their subjects to swear; and the militia, navy, commerce, &c. were all settled pretty nearly on the footing upon which they now are, and which shall be afterwards described; tho' the subsequent altercations that frequently happened between the bashaws and deys, the one endeavouring to recover their former power, and the other to curtail it, caused such frequent complaints and discontents at the Ottoman court, as made them frequently repent their compliance.

In the year 1601, the Spaniards, under the command of Doria the Genoese admiral, made another attempt upon Algiers, in which they were more fortunate than usual, their fleet being only driven back by contrary winds, so that they came off without loss. In 1609, the Moors being expelled from Spain, flock-ed in great numbers to Algiers; and as many of them were very able sailors, they undoubtedly contributed to make the Algerine fleet so formidable as it became soon after; tho' it is probable the frequent attempts made on their city would also induce them to increase their fleet. In 1616, their fleet consisted of 40 sail of ships between 200 and 400 tons, their admiral 500 tons. It was divided into two squadrons, one of 18 sail, before the port of Malaga; and the other at the Cape of Santa Maria, between Lisbon and Seville; both of which fell foul on all Christian ships, both English and French, with whom they pretended to be in friendship, as well as Spaniards and Portuguese, with whom they were at war.

The Algerines were now become very formidable to the European powers. The Spaniards, who were most in danger, and least able to cope with them, solicited the assistance of England, the pope, and other states. The French, however, were the first who dared to show their resentment of the perfidious behaviour of these miscreants; and in 1617, M. Beaulieu was sent against them with a fleet of 50 men of war, who defeated their fleet, took two of their vessels, while their admiral sunk his own ship and crew, rather than fall into his enemies hands.

In 1620, a squadron of English men of war was sent against Algiers, under the conduct of Sir Robert Mansel:

Algiers.

32
Algerines
allowed to
choose their
own deys.

33
They grow
formidable
to the Eu-
ropeans.

³⁴Algiers. Manfel: but of this expedition we have no other account, than that it returned without doing any thing; and the Algerines, becoming more and more insolent, openly defied all the European powers, the Dutch only excepted; to whom, 1625, they sent a proposal, directed to the prince of Orange, that in case they would fit out 20 sail of ships the following year, upon any good service against the Spaniards, they would join them with 60 sail of their own.

An English
squadron
sent against
the Alge-
rines.

The next year, the *Coulolies*, or *Cologlies* (the children of such Turks as had been permitted to marry at Algiers), who were enrolled in the militia, having seized on the citadel, had well nigh made themselves masters of the city; but were attacked by the Turks and renegadoes, who defeated them with terrible slaughter. Many scores of them were executed; and their heads thrown in heaps upon the city-walls, without the eastern gate. Part of the citadel was blown up; and the remaining *Coulolies* were dismissed from the militia, to which they were not again admitted till long after.

³⁵States of
Barbary
throw off
their depen-
dence on
the Porte.

In 1623, the Algerines and other states of Barbary threw off their dependence on the Porte altogether, and set up for themselves. What gave occasion to this was the 25 years truce which Sultan Amurath IV. was obliged to make with the emperor Ferdinand II. to prevent his being overmatched by carrying on a war against him and the sophi of Persia at the same time. As this put a stop to the piratical trade of the Algerines, they proceeded as above-mentioned; and resolved, that whoever desired to be at peace with them, must, distinctly and separately, apply to their government.—No sooner was this resolution taken, than the Algerines began to make prizes of several merchants ships belonging to powers at peace with the Porte. Nay, having seized a Dutch ship and poleacre at Scanderoon, they ventured on shore; and finding the town abandoned by the Turkish aga and inhabitants, they plundered all the magazines and warehouses, and set them on fire.—About this time Louis XIII. undertook to build a fort on their coasts, instead of one formerly built by the Marsilians, and which they had demolished. This, after some difficulty, he accomplished; and it was called the *Bastion of France*: but the situation being afterwards found inconvenient, the French purchased the port of La Calle, and obtained liberty to trade with the Arabians and Moors. The Ottoman court, in the mean time, was so much embarrassed with the Persian war, that there was no leisure to check the Algerine piracies. This gave an opportunity to the vizir and other courtiers to compound matters with the Algerines, and to get a share of their prizes, which were very considerable. However, for form's sake, a severe reprimand, accompanied with threats, was sent them; to which they replied, that “these depredations deserved to be indulged to them, seeing they were the only bulwark against the Christian powers, especially against the Spaniards, the sworn enemies of the Moslem name:” adding, that “if they should pay a punctilious regard to all that could purchase peace, or liberty to trade with the Ottoman empire, they would have nothing to do but set fire to all their shipping, and turn camel-drivers for a livelihood.”

In the year 1635, four younger brothers of a good family in France, entered into an undertaking so desperate, that perhaps the annals of knight-errantry can

VOL. I. Part II.

scarce furnish its equal.—This was no less than to retort the piracies of the Algerines upon themselves; and as they indiscriminately took the ships of all nations, so were these heroes indiscriminately to take the ships belonging to Algiers; and this with a small frigate of ten guns!—In this ridiculous undertaking, 100 volunteers embarked; a Maltese commission was procured, together with an able master, and 36 mariners.—They had the good fortune, on their first setting out, to take a ship laden with wine, on the Spanish coast: with which they were so much elated, that three days after they madly encountered two large Algerine corsairs, one of 20 and the other of 24 guns, both well manned, and commanded by able officers. These two large vessels having got the small frigate between them, plied her furiously with great shot, which soon took off her main-mast: notwithstanding which, the French made so desperate a resistance, that the pirates were not able to take them, till the noise of their fire brought up five more Algerines; when the French vessel, being almost torn to pieces, was boarded and taken. The young knights-errant were punished for their temerity by a dreadful captivity, from which they redeemed themselves in 1642 at the price of 6000 dollars.

³⁶Algiers. Desperate
undertak-
ing of four
younger
brothers.

The Algerines prosecuted their piracies with impunity, to the terror and disgrace of the Europeans, till the year 1652; when a French fleet being accidentally driven to Algiers, the admiral took it into his head to demand a release of all the captives of his nation, without exception. This being refused, the Frenchman without ceremony carried off the Turkish viceroy, and his cadî or judge, who were just arrived from the Porte, with all their equipage and retinue. The Algerines, by way of reprisal, surprised the Bastion of France already mentioned, and carried off the inhabitants to the number of 600, with all their effects; which so provoked the admiral, that he sent them word that he would pay them another visit the next year with his whole fleet.

³⁷A French
admiral
carries off
the Turkish
bashaw.

The Algerines, undismayed by the threats of the French admiral, fitted out a fleet of 16 galleys and galleons, excellently manned and equipped, under the command of Admiral Hali Pinchinin.—The chief design of this armament was against the treasure of Loretto; which, however, they were prevented by contrary winds from obtaining. Upon this they made a descent on Puglia in the kingdom of Naples; where they ravaged the whole territory of Necotra, carrying off a vast number of captives, and among them some nuns. From thence steering towards Dalmatia, they scoured the Adriatic; and loading themselves with immense plunder, left those coasts in the utmost consternation and resentment.

³⁸The Alge-
rines fit out
a formidable
fleet.

At last the Venetians, alarmed at such terrible depredations, equipped a fleet of 28 sail, under the command of Admiral Capello, with express orders to burn, sink, or take, all the Barbary corsairs he met with, either on the open seas, or even in the Grand Signior's harbours, pursuant to a late treaty of peace with the Porte. On the other hand, the captain bashaw, who had been sent out with the Turkish fleet to chase the Florentine and Maltese cruisers out of the Archipelago, understanding that the Algerine squadron was so near, sent express orders to the admiral to come to his assistance. Pinchinin readily agreed; but having first resolved on a descent upon the island of Liffa, or Lifi-

³⁹Which is
totally de-
stroyed by
the Veneti-
ans.

Algiers. na belonging to the Venetians, he was overtaken by Capello, from whom he retired to Valona, a sea-port belonging to the Grand Signior, whither the Venetian admiral pursued him; but the Turkish governor refusing to eject the pirates according to the articles of the peace between the Ottoman court and Venice, Capello was obliged to content himself with watching them for some time. Pinchinin was soon weary of restraint, and ventured out; when an engagement immediately ensued, in which the Algerines were defeated, and five of their vessels disabled; with the loss of 1500 men, Turks, and Christian slaves; besides 1600 galley-slaves who regained their liberty. Pinchinin, after this defeat, returned to Valona, where he was again watched by Capello; but the latter had not lain long at his old anchorage before he received a letter from the senate, desiring him to make no farther attempt on the pirates at that time, for fear of a rupture with the Porte. This was followed by a letter from the governor of Valona, desiring him to take care lest he incurred the Sultan's displeasure by such insults. The brave Venetian was forced to comply; but, resolving to take such a leave of the Algerines as he thought they deserved, observed how they had reared their tents, and drawn their booty and equipage along the shore. He then kept firing among their tents, while some well-manned galliots and brigantines were ordered among their shipping, who attacked them with such bravery, that, without any great loss, they towed out their 16 galleys, with all their cannon, stores, &c.—In this last engagement, a ball from one of the Venetian galleys happening to strike a Turkish mosque, the whole action was considered as an insult upon the Grand Signior. To conceal this, Capello was ordered to sink all the Algerine ships he had taken, except the admiral; which was to be conducted to Venice, and laid up as a trophy. Capello came off with a severe reprimand; but the Venetians were obliged to buy, with 500,000 ducats, a peace from the Porte. The Grand Signior offered to repair the loss of the Algerines by building ten galleys for them, upon condition that they should continue in his service till the end of the ensuing summer; but Pinchinin, who knew how little the Algerines chose to lie under obligations to him, civilly declined the offer.

40 Algiers in the utmost confusion at the news. In the mean time, the news of this defeat and loss filled Algiers with the utmost grief and confusion. The whole city was on the point of a general insurrection, when the bashaw and douwan issued a proclamation, forbidding not only complaints and outcries, under the severest penalties; but all persons whatever to *take their thumbs from within their girdles*, while they were deliberating on this important point. In the mean time, they applied to the Porte for an order, that the Venetians settled in the Levant should make up their loss. But with this the Grand Signior refused to comply, and left them to repair their losses, as well as build new ships, in the best manner they could. It was not long, however, before they had the satisfaction to see one of their corsairs land, with a fresh supply of 600 slaves, whom he had brought from the coast of Iceland, whither he had been directed by a miscreant native taken on board a Danish ship.

41 They set out a new fleet. Our pirates did not long continue in their weak and defenceless state; being able, at the end of two years, to appear at sea with a fleet of 65 sail. The admiral

Pinchinin equipped four galliots at his own expence; Algiers. with which, in conjunction with the Chiayah, or secretary of the bashaw of Tripoli, he made a second excursion. This small squadron, consisting of five galleys and two brigantines, fell in with an English ship of 40 guns; which, however, Pinchinin's captains refused to engage; but being afterwards reproached by him for their cowardice, they swore to attack the next Christian ship which came in their way. This happened 52 to be a Dutch merchantman, of 28 guns and 40 men, their gal- deeply laden, and unable to use her sails by reason of leys defeat- ed by a Dutch mer- chandman. Pinchinin immediately summoned her to surrender; but receiving an ironical answer, drew up his squadron in form of an half moon, that they might pour their shot all at once into their adversary. This, however, the Dutchman avoided, by means of a breeze of wind which fortunately sprung up and enabled him to turn his ship; upon which the galleys ran foul of each other.—Upon this, Pinchinin ran his own galley along side of the merchantman, the upper deck of which 70 Algerines immediately took possession of, some of them cutting the rigging, and others playing the hatches with hand-grenadoes: but the Dutchmen having secured themselves in their close quarters, began to fire at the Algerines on board, from two pieces of cannon loaded with small shot; by which they were all soon killed, or forced to submit. Pinchinin, in the mean time, made several unsuccessful attempts to relieve his men, as well as to surround the Dutchman with his other galleys: but that ship lay so deep in the water, that every shot did terrible execution among the pirates; so that they were obliged to remove farther off. At last the Dutch captain, having ordered his guns to be loaded with cartouches, gave them such a parting volley as killed 200 of them, and sent the rest back to Algiers in a most dismal plight.

But though Pinchinin thus returned in disgrace, the rest of the fleet quickly came back with vast numbers of slaves, and an immense quantity of rich spoils; inso-much that the English, French, and Dutch, were obliged to cringe to the mighty Algerines, who sometimes vouchsafed to be at peace with them, but swore eternal war against Spain, Portugal, and Italy, whom they looked upon as the greatest enemies to the Mahometan name. At last Louis XIV. provoked by the 43 Preparations against Algiers by Louis XIV. grievous outrages committed by the Algerines on the coasts of Provence and Languedoc, ordered, in 1681, a considerable fleet to be fitted out against them, under the marquis du Quesne, vice-admiral of France. His first expedition was against a number of Tripolitan corsairs; who had the good fortune to outrow him, and shelter themselves in the island of Scio belonging to the Turks. This did not, however, prevent him from pursuing them thither, and making such terrible fire upon them as quickly destroyed 14 of their vessels, besides battering the walls of the castle.

This severity seemed only to be designed as a check 44 Algiers to the piracies of the Algerines; but, finding they still bombarded and set on fire by the French. continued their outrages on the French coast, he sailed to Algiers in August 1682, cannonading and bombard- ing it so furiously, that the whole town was in flames in a very little time. The great mosque was battered down, and most of the houses laid in ruins, inso-much that the inhabitants were on the point of abandoning the place; when on a sudden the wind turned about, and

Algiers.

45
 Algerines
 commit
 dreadful ra-
 vages in
 France.

46
 The city a-
 gain bom-
 barded.

and obliged Du Quesne to return to Toulon. The Algerines immediately made reprisals, by sending a number of galleys and galliots to the coasts of Provence, where they committed the most dreadful ravages, and brought away a vast number of captives: upon which a new armament was ordered to be got ready at Toulon and Marseilles against the next year; and the Algerines, having received timely notice, put themselves into as good a state of defence as the time would allow.

In May 1683, Du Quesne with his squadron cast anchor before Algiers; where, being joined by the Marquis D'Affranville, at the head of five stout vessels, it was resolved to bombard the town next day. Accordingly 100 bombs were thrown into it the first day, which did terrible execution; while the besieged made some hundred discharges of their cannon against them, without doing any considerable damage. The following nights the bombs were again thrown into the city in such numbers, that the dey's palace and other great edifices were almost destroyed; some of their batteries were dismounted, and several vessels sunk in the port. The dey and Turkish bashaw, as well as the whole soldiery, alarmed at this dreadful havoc, immediately sued for peace. As a preliminary, the immediate surrender was insisted on of all Christian captives who had been taken fighting under the French flag; which being granted, 142 of them were immediately delivered up, with a promise of sending him the remainder as soon as they could be got from the different parts of the country. Accordingly Du Quesne sent his commissary-general and one of his engineers into the town; but with express orders to insist upon the delivery of all the French captives without exception, together with the effects they had taken from the French; and that Mezomorto their then admiral, and Hali Rais one of their captains, should be given as hostages.

This last demand having embarrassed the dey, he assembled the douwan, and acquainted them with it: upon which Mezomorto fell into a violent passion, and told the assembly, that the cowardice of those who sat at the helm had occasioned the ruin of Algiers; but that, for his part, he would never consent to deliver up any thing that had been taken from the French. He immediately acquainted the soldiery with what had passed; which so exasperated them, that they murdered the dey that very night, and on the morrow chose Mezomorto in his place. This was no sooner done, than he cancelled all the articles of peace which had been made, and hostilities were renewed with greater fury than ever.

47
 Set on fire
 and almost
 destroyed.]

The French admiral now kept pouring in such volleys of bombs, that, in less than three days, the greatest part of the city was reduced to ashes, and the fire burnt with such vehemence, that the sea was enlightened with it for more than two leagues round. Mezomorto, unmoved at all these disasters, and the vast number of the slain, whose blood ran in rivulets along the streets; or rather, grown furious and desperate, sought only how to wreak his revenge on the enemy; and, not content with causing all the French in the city to be cruelly murdered, ordered their consul to be tied hand and foot, and fastened alive to the mouth of a mortar, from whence he was shot away against their navy.—By this piece of inhumanity Du Quesne was so exas-

perated, that he did not leave Algiers till he had utterly destroyed all their fortifications, shipping, almost all the lower part, and above two-thirds of the upper part, of the city, by which means it became little else than a heap of ruins.

The haughty Algerines were now thoroughly convinced that they were not invincible; and, therefore, immediately sent an embassy into France, begging in the most abject terms for peace; which Louis immediately granted, to their inexpressible joy. They now began to pay some regard to other nations, and to be a little cautious how they wantonly incurred their displeasure. The first bombardment by the French had so far humbled the Algerines, that they condescended to enter into a treaty with England; which was renewed, upon terms very advantageous to the latter, in 1686. It is not to be supposed, however, that the natural perfidy of the Algerines would disappear on a sudden: notwithstanding this treaty, therefore, they lost no opportunity of making prizes of the English ships when they could conveniently come at them. Upon some infringement of this kind, Captain Beach drove ashore and burnt seven of their frigates in 1695; which produced a renewal of the treaty five years after: but it was not till the taking of Gibraltar and Port Mahon, that Britain could have a sufficient check upon them to enforce the observation of treaties; and these have since proved such restraints upon Algiers, that they still continue to pay a greater deference to the English than to any European power.

The present century furnishes no very remarkable events with regard to Algiers; except the taking of the famed city of Oran from the Spaniards in 1708 (which however they regained in 1737), and the expulsion of the Turkish bashaw, and uniting his office to that of dey in 1710. This introduced the form of government which still continues in Algiers.

The dey is now absolute monarch; and pays no other revenue to the Porte than that of a certain number of fine boys or youths, and some other presents which are sent thither yearly. His own income, probably, rises and falls according to the opportunities he hath of fleecing both natives and foreigners; whence it is variously computed by different authors. Dr Shaw computes the taxes of the whole kingdom to bring into the treasury no more than 300,000 dollars; but supposes that the eighth part of the prizes, the effects of those persons who die without children, joined to the yearly contributions raised by the government, presents from foreigners, fines and oppressions, may bring in about as much more. Both the dey, and officers under him, enrich themselves by the same laudable methods of rapine and fraud; which it is no wonder to find the common people practising upon one another, and especially upon strangers, seeing they themselves are impoverished by heavy taxes and the injustice of those who are in authority.

We have already hinted, that the first deys were elected by the militia, who were then called the *douwan*, or common-council. This elective body was at first composed of 800 militia-officers, without whose consent the dey could do nothing; and upon some urgent occasions, all the officers residing in Algiers, amounting to above 1500, were summoned to assist. But since the deys, who may be compared to the Dutch Stadtholders,

Algiers.

48
 Algerines
 sue for
 peace.

49
 Seven of
 their ships
 burnt by
 capt. Beach.

50
 Expulsion of
 the Turkish
 bashaw.

51
 Revenues,
 &c. of the
 dey.

Algiers. Stadtholders, have become more powerful, the douwan is principally composed of 30 chiah-bashaws, or colonels, with now and then the musti and cadi upon some emergencies; and, on the election of a dey, the whole soldiery are allowed to come and give their votes. All the regulations of state ought to be determined by that assembly, before they pass into a law, or the dey hath power to put them in execution: but, for many years back, the douwan is of so little account, that it is only convened out of formality, and to give assent to what the dey and his chief favourites have concerted beforehand. The method of gathering the votes in this august assembly is perfectly agreeable to the character of those who compose it. The aga, or general of the janizaries, or the president *pro tempore*, first proposes the question; which is immediately repeated with a loud voice by the chia-bashaws, and from them echoed again by four officers called *bashaldalas*, from these the question is repeated from one member of the douwan to another, with strange contortions, and the most hideous growlings, if it is not to their liking. From the loudness of this growling noise, the aga is left to guess as well as he can whether the majority of the assembly are pleased or displeased with the question; and from such a preposterous method, it is not surprising that these assemblies should seldom end without some tumult or disorder. As the whole body of the militia is concerned in the election of a new dey, it is seldom carried on without blows and bloodshed: but when once the choice is made, the person elected is saluted with the words *ALLA BARICK*, "God bless you, and prosper you;" and the new dey usually causes all the officers of the douwan who had opposed his election to be strangled, filling up their places with those who had been most zealous in promoting it. From this account of the election of the deys, it cannot be expected that their government should be at all secure; and as they arrive at the throne by tumult, disorder, and bloodshed, they are generally deprived of it by the same means, scarcely one in ten of them having the good fortune to die a natural death.

52
Strange method of gathering the votes of the douwan.

53
Punishments, &c.

In this country it is not to be expected that justice will be administered with any degree of impartiality. The Mahometan soldiery, in particular, are so much favoured, that they are seldom put to death for any crime except rebellion; in which case they are either strangled with a bow-string, or hanged to an iron hook. In lesser offences, they are fined, or their pay stopped; and if officers, they are reduced to the station of common soldiers, from whence they may gradually raise themselves to their former dignity. Women guilty of adultery, have a halter tied about their necks, with the other end fastened to a pole, by which they are held under water till they are suffocated. The bastinado is likewise inflicted for small offences; and is given either upon the belly, back, or soles of the feet, according to the pleasure of the cadi; who also appoints the number of strokes. These sometimes amount to 200 or 300, according to the indulgence the offender can obtain either by bribery or friends; and hence he often dies under this punishment, for want of powerful enough advocates. But the most terrible punishments are these inflicted upon the Jews or Christians who speak against Mahomet or his religion; in which case, they must either turn Mahometan, or be impaled alive. If they

afterwards apostatize, they are burned or roasted alive, or else thrown down from the top of the city-walls, upon iron hooks, where they are caught by different parts of their body, according as they happen to fall, and sometimes expire in the greatest torments; though by accident they may be put out of pain at once, as we have already related of the Spanish adventurer John Gascon. This terrible punishment, however, begins now to be disused.

The officer next in power to the dey is the aga of the janizaries, who is one of the oldest officers in the army, and holds his post only for two months. He is then succeeded by the chiah, or next senior officer. During the two months in which the aga enjoys his dignity, the keys of the metropolis are in his hands; all military orders are issued out in his name; and the sentence of the dey upon any offending soldier, whether capital or not, can only be executed in the court of his palace.—As soon as he is gone through this short office, he is considered as *mazoul*, or superannuated; receives his pay regularly, like the rest of the militia, every two moons; is exempt from all further duties, except when called by the dey to assist at the grand council, to which he hath, however, a right to come at all times, but hath no longer a vote in it.—Next to the aga in dignity is the secretary of state, who registers all the public acts; and after him are the 30 chiahs, or colonels, who sit next to the aga in the douwan, and in the same gallery with him. Out of this class are generally chosen those who go ambassadors to foreign courts, or who disperse the dey's orders throughout the realm.—Next to them are 800 bolluck-bashaws, or eldest captains, who are promoted to that of chiah-bashaws, according to their seniority. The oldack-bashaws, or lieutenants, are next; who amount to 400, and are regularly raised to the rank of captains in their turn, and to other employments in the state, according to their abilities. These, by way of distinction, wear a leather strap, hanging down to the middle of their back. One rule is strictly observed in the rotation of these troops from one deputy to a higher; viz. the right of seniority; one single infringement of which would cause an insurrection, and probably cost the dey his life. Other military officers of note are the vekelards, or purveyors of the army; the peys, who are the four oldest soldiers, and consequently the nearest to preferment; the foulacks, who are the next in seniority to them, and are part of the dey's body-guard, always marching before him when he takes the field, and distinguished by their carbines and gilt scymiters, with a brass gun on their caps; the kayts, or Turkish soldiers, each band of whom have the government of one or more adowars, or itinerant villages, and collect their taxes for the dey; and the fagiards, or Turkish lance-men, 100 of whom always attend the army, and watch over the water appointed for it. To these we may add the beys, or governors of the three great provinces of the realm. All the above-mentioned officers ought to compose the great douwan or council above-mentioned; but only the 30 chiah-bashaws have a right to sit in the gallery next after the dey: The rest are obliged to stand on the floor of the hall, or council-chamber, with their arms across, and, as much as possible, without motion; neither are they permitted to enter with their swords on, for fear of a tumult. As for those who

54
Aga of the janizaries and other military officers.

Algiers. who have any matters to transact with the douwan, they must stand without, let the weather be ever so bad; and there they are commonly presented with coffee by some of the inferior officers, till they are dismissed.

55
Division of
the king-
dom.

The kingdom of Algiers is at present divided into three provinces or districts, viz. the eastern, western, and southern. The eastern, or Levantine government, which is by far the most considerable of the three, and is also called *Beylick*, contains the towns of Bona, Constantina, Gigeri, Bujeyah, Steffa, Tebef, Zamoura, Biscara, and Necanz, in all which the Turks have their garrisons: besides which, it includes the two ancient kingdoms of Cuco and Labez, though independent of the Algerine government, to whose forces their country is inaccessible; so that they still live under their own cheyks chosen by each of their adowars or hords. To these we may add a French factory at Callo, under the direction of the company of the French Bastion.—The western government hath the towns of Oran, Tremecen, Mostagan, Tenez, and Secrelly with its castle and garrison.—The southern government hath neither town, village, nor even a house, all the inhabitants living in tents, which obliges the dey and his forces to be always encamped.

56
Rivers.

The most considerable rivers of Algiers are the Zha, or Zis, which runs across the province of Tremecen, and the desert of Anguid, falling into the Mediterranean near the town of Tabecrita, where it has the name of *Sirut*. (2.) The Haregol, supposed the *Sign* of Ptolemy, comes down from the great Atlas, crosses the desert of Anguid, and falls into the sea, about five leagues from Oran. (3.) The Mina, supposed the *Chylematis* of Ptolemy, a large river, which runs through the plains of Bathala, and falls into the sea near the town of Arzew. This river hath lately received the name of *Cena*, who rebuilt the town of Bathalaw after it had been destroyed. (4.) The Shellif, Zilef, or Zilif, descending from the mount Gnanexeris, runs through some great deserts, the lake Titteri, the frontiers of Tremecen and Tenez, falling into the sea a little above the city of Mostagan. (5.) The Celef, supposed to be the *Carthena* of the ancients, falls into the sea about three leagues west of Algiers, after a short course of 18 or 20 leagues. (6.) The Hued-alquivir, supposed to be the *Nalabata*, or *Nafaba*, of the ancients, and called by the Europeans *Zinganir*, runs down with a swift course, through some high mountains of Cuco, and falls into the sea near Bujeyah. Whilst the city of Bujeyah was in the hands of the Christians, the mouth of this river was so choaked up with sand, that no vessel could come up into it: but in 1555, very soon after it was taken by the Moors, the great rains swelled it to such a degree, that all the sand and mud was carried off; so that galleys, and other vessels, have ever since entered it with ease, where they lie safe from storms, and all winds, but that which blows from the north. (7.) Suf-Gemar, or Suf-Gimmar al Rumniel, supposed to be the *Ampfaga* of Ptolemy, hath its source on mount Auras, on the confines of Atlas; thence runs through some barren plains, and the fruitful ones of Constantina, where its stream is greatly increased by some other rivers it receives; from thence running northward, along the ridges of some high mountains, it falls into the sea a little east of Gigeri.

57
Harbour of
Bujeyah
cleared by
accident.

(8.) The Ladag, or Ludeg, runs down from mount Atlas through part of Constantina, and falls into the sea a little eastward of Bona. (9.) Guadi, or Gaudel Barbal, springs from the head of Orbus, or Urbs, in Tripoli, runs through Bujeyah, and falls into the sea near Tabarea.

Besides these there are many others of less note; of which, however, we do not find that the Algerines avail themselves as they might do, their genius leading them too much to the piratical trade to mind any real advantage that might be derived from their own country. The corsairs, or pirates, form each a small republic, of which the rais or captain is the supreme bashaw; who, with the officers under him, form a kind of douwan, in which every matter relating to the vessel is decided in an arbitrary way. These corsairs are chiefly instrumental in importing whatever commodities are brought into the kingdom either by way of merchandise or prizes. These consist chiefly of gold and silver stuffs, damasks, cloths, spices, tin, iron, plated brass, lead, quicksilver, cordage, sail-cloth, bullets, cochineal, linen, tartar, alum, rice, sugar, soap, cotton raw and spun, copperas, aloes, brazil and logwood, vermilion, &c. Very few commodities, however, are exported from this part of the world: the oil, wax, hides, pulse, and corn produced, being but barely sufficient to supply the country; though, before the loss of Oran, the merchants have been known to ship off from one or other of the parts of Barbary several thousand tons of corn. The consumption of oil, though here in great abundance, is likewise so considerable in this kingdom, that it is seldom permitted to be shipped off for Europe. The other exports consist chiefly in ostriches feathers, copper, rugs, silk sashes, embroidered handkerchiefs, dates, and Christian slaves. Some manufactures in silk, cotton, wool, leather, &c. are carried on in this country, but mostly by the Spaniards settled here, especially about the metropolis. Carpets are also a manufacture of the country, which, though much inferior to those of Turkey, both in beauty and fineness, are preferred by the people to lie upon, on account of their being both cheaper and softer. There are also, at Algiers, looms for velvet, taffaties, and other wrought silks; and a coarse sort of linen is likewise made in most parts of the kingdom. The country furnishes no materials for ship-building. They have neither rops, tar, sails, anchors, nor even iron. When they can procure enough of new wood to form the main timbers of a ship, they supply the rest from the materials of prizes which they have made; and thus find the secret of producing new and swift sailing vessels from the ruins of the old. Of all the states on the coast of Barbary, the Algerines are the strongest at sea.

The inhabitants along the sea-coasts are a mixture of different nations; but chiefly Moors and Morecos driven out of Catalonia, Arrogan, and other parts of Spain. Here are also great numbers of Turks, who come from the Levant to seek their fortune; as well as multitudes of Jews and Christians taken at sea, who are brought hither to be sold for slaves. The Berebers are some of the most ancient inhabitants of the country; and are supposed to be descended from the ancient Sabeans, who came hither from Arabia Felix, under the conduct of one of their princes. Others believe

Algiers.

58
Account of
the corsairs,
conime: cc,
&c.

58
Inhabitants.

Algiers.

lieve them to be some of the Canaanites driven out of Palestine by Joshua. These are dispersed all over Barbary, and divided into a multitude of tribes under their respective chiefs: most of them inhabit the mountainous parts; some range from place to place, and live in tents, or portable huts; others in scattered villages: they have, nevertheless, kept themselves for the most part from intermixing with other nations. The Berebers are reckoned the richest of all, go better clothed, and carry on a much larger traffic of cattle, hides, wax, honey, iron, and other commodities. They have also some artificers in iron, and some manufacturers in the weaving branch.—The name of *Bereber* is supposed to have been originally given them on account of their being first settled in some desert place. Upon their increasing in process of time, they divided themselves into five tribes, probably on account of religious differences, called the *Zinhagians*, *Musamedins*, *Zeneti*, *Hoares*, and *Gomeres*; and these having produced 600 families, subdivided themselves into a great number of petty tribes.—To these we may add the *Zwonwabs*, by European authors called *Azuagues*, or *Assagues*, who are likewise dispersed over most parts of Barbary and Numidia. Great numbers of these inhabit the mountainous parts of Cuco, Labez, &c. leading a wandering pastoral life.—But the most numerous inhabitants are the Moors and Arabians. The former are very stout and warlike, and skilful horsemen; but so addicted to robbing, that one cannot safely travel along the country at a distance from the towns without a guard, or at least a marabout or saint for a safeguard. For as they look upon themselves to be the original proprietors of the country, and not only as dispossessed by the rest of the inhabitants, but reduced by them to the lowest state of poverty, they make no scruple to plunder all they meet by way of reprisal. The inhabitants, in general, have a pretty fair complexion; they are robust and well proportioned. People of distinction wear their beard; they have rich clothes made of silk, embroidered with flowers of gold, and turbans enriched with jewels. The Turks, who compose the military force, have great privileges, pay no taxes, are never publicly punished, and rarely in private. The lowest soldier domineers over the most distinguished Moors at pleasure. If he finds them better mounted than himself, he exchanges horses without ceremony. The Turks alone have the privilege of carrying fire-arms. Many good qualities, however, distinguish them in spite of this excess of despotism. They never game for money, nor even for trifles; and they never profane the name of the Deity. They soon forget their private quarrels; and after the first paroxysm of resentment is over, it is infamy for a Turk to keep in remembrance the injuries he has received. In this respect certainly they are less barbarous than other nations that boast of their civilization. See MOORS.

ALGIERS, a city, the capital of the above kingdom, is probably the ancient *Icosium*: by the Arabians called *Algezair*, or rather *Al-Jezier*, or *Al-Jezerah*, i. e. *the island*, because there was an island before the city, to which it hath been since joined by a mole. It is built on the declivity of a hill by the sea-side, in the form of an amphitheatre: at sea, it looks like the top-sail of a ship. The tops of the houses are quite flat and white; insomuch, that when it is first discovered, one

would take it to be a place where they bleach linen. Algiers. One house rises above another in such a manner that they do not hinder each other's prospect. The streets are so narrow, that they will scarce admit two persons to walk a-breast, and the middle part is lower than the sides. When any loaded beasts, such as camels, horses, mules, or asses, pass along, you are forced to stand up close to the wall to let them pass by. There is but one broad street, which runs through the city from east to west, in which are the shops of the principal merchants, and the market for corn and other commodities. The lower part of the walls of the city are of hewn stone, and the upper part of brick; they are 30 feet high on the land side, and 40 towards the sea; the fosses or ditches are twenty feet broad, and seven deep. There is no sweet water in the city; and tho' there is a tank or cistern in every house, yet they often want water, because it rains but seldom: the chief supply is from a spring on a hill, the water of which is conveyed by pipes to above a hundred fountains, at which a bowl is fastened for the use of passengers. The common reservoir is at the end of the mole, where the ships take in their water. Every one takes his turn at these places, except the Turks, who are first, and the Jews last. There are five gates, which are open from sun-rising till sun-setting; and seven forts, or castles, without the walls, the greatest of which is on the mole without the gate, all of which are well supplied with great guns. There are ten large mosques, and fifty small ones; three great colleges or public schools, and a great number of petty ones for children. The houses are square, and built of stone and brick, with a square court in the middle, and galleries all round. There are said to be about 100,000 inhabitants in the city, comprehending 5000 Jewish families, besides Christians. There are four fundics, or public inns, such as are in Turkey; and six cazernes, or barracks, for the unmarried Turkish soldiers, which will hold 600 each. There are no inns for Christians to lodge at; but only a few tippling huts kept by slaves, for the accommodation of Greeks and the poorer sort of travellers, where any thing may be had for money. Here are bagnios, or public baths, in the same manner as in Turkey, at a very moderate rate. The women have baths of their own, where the man dare not come. Without the city there are a great number of sepulchres, as also cells or chapels, dedicated to marabouts, or reputed saints, which the women go to visit every Friday. The Turkish soldiers are great tyrants; for they not only turn others out of the way in the streets, but will go to the farm-houses in the country for twenty days together, living on free quarters, and making use of every thing, not excepting the women. The Algerines eat, as in Turkey, sitting cross-legged round a table about four inches high, and use neither knives nor forks; before they begin, every one says *Be isme Allah*, "In the name of God." When they have done, a slave pours water on all their hands as they sit, and then they wash their mouths. Their drink is water, sherbet, and coffee. Wine is not allowed, though drank immoderately by some. The prospect of the country and sea from Algiers is very beautiful, being built on the declivity of a mountain; but the city, though for several ages it has braved some of the greatest powers in Christendom, it is said, could make but a faint defence against a regular siege; and that

Algol. that three English fifty-gun ships might batter it about the ears of its inhabitants from the harbour. If so, the Spaniards must have been very deficient either in courage or conduct. They attacked it in the year 1775, by land and by sea, but were repulsed with great loss; though they had near 20,000 foot and 2000 horse, and 47 king's ships of different rates and 346 transports. In the year 1783 and 1784, they also renewed their attacks by sea to destroy the city and galleys; but, after spending a quantity of ammunition, bombs, &c. were forced to retire without either its capture or extinction. The mole of the harbour is 500 paces in length, extending from the continent to a small island where there is a castle and large battery. E. Long. 3. 30. N. Lat. 36. 40.

ALGOL, a fixed star of the third magnitude, called *Medusa's Head*, in the constellation Perseus; its longitude is $21^{\circ} 50' 42''$ of Taurus, and its latitude $23^{\circ} 23' 47''$ north; according to Flamsteed's catalogue. For an account of its changes, period, and other circumstances, see *ASTRONOMY-Index*.

ALGONQUINS, a nation in North America, who formerly possessed great tracts of land along the north shore of the river St Lawrence. For a long time they had no rivals as hunters and warriors, and were long in alliance with the Iroquois; whom they agreed to protect from all invaders, and to let them have a share of their venison. The Iroquois, on the other hand, were to pay a tribute to their allies, out of the culture of the earth; and to perform for them all the menial duties, such as slaying the game, curing the flesh, and dressing the skins. By degrees, however, the Iroquois associated in the hunting matches and warlike expeditions of the Algonquins; so that they soon began to fancy themselves as well qualified either for war or hunting as their neighbours. One winter, a large detachment of both nations having gone out a-hunting, and secured, as they thought, a vast quantity of game, six young Algonquins and as many Iroquois were sent out to begin the slaughter. The Algonquins, probably become a little jealous of their associates, upon seeing a few elks, desired the Iroquois to return, on pretence that they would have sufficient employment in slaying the game they should kill; but after three days hunting, having killed none, the Iroquois exulted, and in a day or two privately set out to hunt for themselves. The Algonquins were so exasperated at seeing their rivals return laden with game, that they murdered all the hunters in the night-time. The Iroquois dissembled their resentment; but in order to be revenged, applied themselves to study the art of war as practised among those savage nations. Being afraid of engaging with the Algonquins at first, they tried their prowess on other inferior nations, and, when they thought themselves sufficiently expert, attacked the Algonquins with such diabolical fury, as showed they could be satisfied with nothing less than the extermination of the whole race; which, had it not been for the interposition of the French, they would have accomplished.—The few Algonquin nations that are now to be seen, seem entirely ignorant of agriculture, and subsist by fishing and hunting. They allow themselves a plurality of wives; notwithstanding which, they daily decrease in populousness, few or none of their nations containing above 6000 souls, and many of them not 2000. Their language is

one of the three radical ones in North America, being understood from the river St Lawrence to the Mississippi.

ALGOR, with physicians, an unusual coldness in any part of the body.

ALGORITHM, an Arabic word expressive of numerical computation.

ALGUAZIL, in the Spanish polity, an officer whose business it is to see the decrees of a judge executed.

ALHAGI, in botany, the trivial name of a species of hedsarum. See *HEDYSARUM*.

ALHAMA, a very pleasant town of the kingdom of Granada, in Spain, situated in the midst of some craggy mountains, about 25 miles S. W. of Granada, on the banks of the Rio Frio, in W. Long. 1. 10. N. Lat. 36. 59. and having the finest warm baths in all Spain. It was taken from the Moors in 1481. The inhabitants, though surprised, and the town without a garrison, made a gallant defence: but being at length forced to submit, the place was abandoned to the pillage of the Christian soldiers; who, not satisfied with an immense quantity of gold and jewels, made slaves of upwards of 3000 of the inhabitants.

ALHAMBRA, the ancient fortress and residence of the Moorish monarchs of Granada. It derives its name from the red colour of the materials which it was originally built with, Alhambra signifying a red house. It appears to a traveller a huge heap of as ugly buildings as can well be seen, all huddled together, seemingly without the least intention of forming one habitation out of them. The walls are entirely unornamented, all gravel and pebbles, daubed over with plaster by a very coarse hand: yet this is the palace of the Moorish kings of Granada, indisputably the most curious place within that exists in Spain, perhaps in the world. In many countries may be seen excellent modern as well as ancient architecture, both entire and in ruins; but nothing to be met with any where else can convey an idea of this edifice, except the decorations of an opera, or the tales of the genii.

Passing round the corner of the emperor's palace, one is admitted at a plain unornamented door in a corner. On my first visit, says Mr Swinburne, I confess I was struck with amazement, as I stepped over the threshold, to find myself on a sudden transported into a species of fairy land. The first place you come to is the court called the *communa* or *del mesucar*, that is the *common baths*; an oblong square, with a deep basin of clear water in the middle; two flights of marble steps leading down to the bottom; on each side a parterre of flowers, and a row of orange-trees. Round the court runs a peristyle paved with marble; the arches bear upon very slight pillars, in proportions and style different from all the regular orders of architecture. The ceilings and walls are incrustated with fret-work in stucco, so minute and intricate, that the most patient draughtsman would find it difficult to follow it, unless he made himself master of the general plan. This would facilitate the operation exceedingly; for all this work is frequently and regularly repeated at certain distances, and has been executed by means of square moulds applied successively, and the parts joined together with the utmost nicety. In every division are Arabic sentences of different lengths, most

Travels in Spain.

of

Algor
||
Alhambra.

Alhambra. of them expressive of the following meanings: "There is no conqueror but God;" or, "Obedience and honour to our Lord Abouabdoula." The ceilings are gilt or painted, and time has caused no diminution in the freshness of their colours, though constantly exposed to the air. The lower part of the walls is mosaic, disposed in fantastic knots and festoons. A work so novel, so exquisitely finished, and so different from all that he had ever seen, must afford a stranger the most agreeable sensations while he treads this magic ground. The porches at the ends are more like grotto-work than any thing else to which they can be compared. That on the right hand opens into an octagon vault, under the emperor's palace, and forms a perfect whispering gallery, meant to be a communication between the offices of both houses.

Opposite to the door of the communa through which you enter, is another leading into the *quarto de los leones*, or apartment of the lions; which is an oblong court, 100 feet in length and 50 in breadth, environed with a colonade 7 feet broad on the sides and 10 at the end. Two porticos or cabinets about 15 feet square, project into the court at the two extremities. The square is paved with coloured tiles; the colonnade with white marble. The walls are covered five feet up from the ground with blue and yellow tiles, disposed chequerwise. Above and below is a border of small escutcheons, enamelled blue and gold, with an Arabic motto on a bend; signifying, "No conqueror but God." The columns that support the roof and gallery are of white marble, very slender, and fantastically adorned. They are 9 feet high, including base and capital, and 8½ inches diameter. They are very irregularly placed; sometimes singly, at others in groups of three, but more frequently two together. The width of the horse-shoe arches above them is four feet two inches for the large ones, and three for the smaller. The ceiling of the portico is finished in a much finer and more complicated manner than that of the communa, and the stucco laid on the walls with inimitable delicacy; in the ceiling it is so artfully frosted and handled as to exceed belief. The capitals are of various designs, though each design is repeated several times in the circumference of the court, but not the least attention has been paid to placing them regularly or opposite to each other. Not the smallest representation of animal life can be discovered amidst the varieties of foliages, grotesques, and strange ornaments. About each arch is a large square of arabesques, surrounded with a rim of characters, that are generally quotations from the Koran. Over the pillars is another square of delightful filligree work. Higher up is a wooden rim, or kind of cornice, as much enriched with carving as the stucco that covers the part underneath. Over this projects a roof of red tiles, the only thing that disfigures this beautiful square. This ugly covering is modern, put on by order of Mr Wall, the late prime minister, who a few years ago gave the Alhambra a thorough repair. In Moorish times, the building was covered with large painted and glazed tiles, of which some few are still to be seen. In the centre of the court are twelve ill-made lions muzzled, their fore parts smooth, their hind parts rough, which bear upon their backs an enormous basin, out of which a lesser rises. While the pipes were kept in good or-

der, a great volume of water was thrown up, that, falling down into the basins, passed through the basins, and issued out of their mouths into a large reservoir, where it communicated by channels with the jet d'eau in the apartments. This fountain is of white marble, embellished with many festoons and Arabic distichs, thus translated.

"See'st thou not how the water flows copiously like the Nile?"

"This resembles a sea washing over its shores, threatening shipwreck to the mariner."

"This water runs abundantly, to give drink to the lions."

"Terrible as the lion is our king in the day of battle."

"The Nile gives glory to the king, and the lofty mountains proclaim it."

"This garden is fertile in delights: God takes care that no noxious animal shall approach it."

"The fair princess that walks in this garden, covered with pearls, augments its beauty so much, that thou may'st doubt whether it be a fountain that flows, or the tears of her admirers."

Passing along the colonnade, and keeping on the south side, you come to a circular room used by the men as a place for drinking coffee and sorbets in. A fountain in the middle refreshed the apartment in summer. The form of this hall, the elegance of its cupola, the cheerful distribution of light from above, and the exquisite manner in which the stucco is designed, painted, and finished, exceed all powers of description. Every thing in it inspires the most pleasing, voluptuous ideas; yet in this sweet retreat they pretend that Abouabdoulah assembled the Abencerrages, and caused their heads to be struck off into the fountain. Continuing your walk round, you are next brought to a couple of rooms at the head of the court, which are supposed to have been tribunals or audience-chambers.

Opposite to the *Sala de los Abencerrages* is the entrance into the *Torre de las dos hermanas*, or the tower of the two sisters; so named from two very beautiful pieces of marble laid as flags in the pavement. This gate exceeds all the rest in profusion of ornaments, and in beauty of prospect which it affords through a range of apartments, where a multitude of arches terminate in a large window open to the country. In a gleam of sunshine, the variety of tints and lights thrown upon this enfilade are uncommonly rich. The first hall is the concert-room, where the women sat; the musicians played above in four balconies. In the middle is a jet d'eau. The marble pavement is equal to the finest existing, for the size of the flags and evenness of the colour. The two sisters, which give name to the room, are slabs that measure 15 feet by 7½, without flaw or stain. The walls, up to a certain height, are mosaic, and above are divided into very neat compartments of stucco, all of one design, which is also followed in many of the adjacent halls and galleries. The ceiling is a fretted cove. To preserve this vaulted roof, as well as some of the other principal cupolas, the outward walls of the towers are raised 10 feet above the top of the dome, and support another roof over all, by which means no damage can ever be caused by wet weather or excessive heat and cold. From this hall you pass round the little myrtle garden

Alhambra. of Lindaraxa, into an additional building made to the east end by Charles V. The rooms are small and low. His dear motto, *Plus outré*, appears on every beam. This leads to a little tower, projecting from the line of the north wall, called *El tocador*, or the dressing-room of the sultana. It is a small square cabinet, in the middle of an open gallery, from which it receives light by a door and three windows. The look-out is charming. In one corner is a large marble flag, drilled full of holes, through which the smoke of perfumes ascended from furnaces below; and here, it is presumed, the Moorish queen was wont to sit to fumigate and sweeten her person. The emperor caused this pretty room to be painted with representations of his wars, and a great variety of grotesques, which appear to be copies, or at least imitations, of those in the loggie of the Vatican. From hence you go through a long passage to the hall of ambassadors, which is magnificently decorated with innumerable varieties of mosaics, and the mottos of all the kings of Granada. This long narrow antichamber opens into the communa on the left hand, and on the right into the great audience-hall in the tower of Comares; a noble apartment, 36 feet square, 36 high up to the cornice, and 18 from thence to the centre of the cupola. The walls on three sides are 15 feet thick, on the other 9; the lower range of windows 13 feet high. The whole wall is inlaid with mosaic of many colours, disposed in intricate knots, stars, and other figures. In every part various Arabic sentences are repeated,

Having thus completed the tower of the upper apartments, which are upon a level with the officers of the new palace, you descend to the lower floor, which consisted of bed chambers and summer-rooms: the back-stairs and passages, that facilitated the intercourse between them, are without number. The most remarkable room below is the king's bedchamber, which communicated, by means of a gallery, with the upper story. The beds were placed in two alcoves, upon a raised pavement of blue and white tiles; but as it was repaired by Philip V. who passed some time here, it cannot be said how it may have been in former times. A fountain played in the middle, to refresh the apartment in hot weather. Behind the alcoves are small doors, that conduct you to the royal baths. These consist of one small closet with marble cisterns for washing children, two rooms for grown up persons, and vaults for boilers and furnaces that supplied the baths with water and the stoves with vapours. The troughs are formed of large slabs of white marble; the walls are beautified with party-coloured earthen ware; light is admitted by holes in the coved ceiling.

Hard by is a whispering gallery, and a kind of labyrinth, said to have been made for the diversion of the women and children. One of the passages of communication is fenced off with a strong iron grate, and called *the prison of the sultana*; but it seems more probable that it was put up to prevent any body from climbing up into the womens quarter.

Under the council room is a long slip, called *the king's study*; and adjoining to it are several vaults, said to be the place of burial of the royal family. In the year 1574, four sepulchres were opened; but as they contained nothing but bones and ashes, were immediately closed again.

VOL. I. Part II.

This description of the Alhambra may be finished by observing how admirably every thing was planned and calculated for rendering this palace the most voluptuous of all retirements; what plentiful supplies of water were brought to refresh it in the hot months of summer; what a free circulation of air was contrived, by the judicious disposition of doors and windows; what shady gardens of aromatic trees; what noble views over the beautiful hills and fertile plains! No wonder the Moors regretted Granada; no wonder they still offer up prayers to God every Friday for the recovery of this city, which they esteem a terrestrial paradise. See GRANADA.

ALI, gives the denomination to a sect, or division, among the Mahometans, who adhere to the right of succession of Ali the fourth khalif or successor of Mahomet, and to the reform of Musselmanism introduced by him. The sectaries of Ali are more particularly called *Schiites*; and stand opposed to the *Sunnites*, or sect of Omar, who adhere to the law as left by Mahomet, Abubeker, and Omar. Ali was cousin of Mahomet, and son-in-law of that prophet, having married his daughter Fatimah. After Mahomet's death, great disputes arose about the succession. Many stood for Ali; but Abubeker was preferred, and elected the first khalif. Ali took his turn, after the death of Othman.—The Persians are the chief adherents to the sect of Ali, whom they hold to have been the legitimate successor of Mahomet, and Abubeker an usurper. On the contrary, the Turks are of the sect of Omar; and hold Ali in execration, having raised a furious civil war among the Mussulmans. The distinguishing badge of the followers of Ali is a red turban, which is worn by the Persians, who are hence called in derision, by the Turks, *Kisilbachi*, q. d. *red-heads*. Ali is reputed the author of several works, particularly a *Centiloquium*, in great esteem among the Arabs and Persians, part of which has been published in English by Mr Ockley.

ALJAMEIA is a name which the Moriscoes in Spain give to the language of the Spaniards. Among other articles agreed on by the junto, which was appointed by the emperor Charles V. in 1526, in favour of the Moriscoes, this was one, That the Moriscoes should no longer speak *Algavareia*, i. e. Moorish or Arabic; but should all speak *Aljameia*, i. e. Spanish, as it was called by the Moors, and all their writings and contracts should be in that language.

ALIAS, in law, a second or farther writ issued from the courts of Westminster, after a *capias*, &c. sued out without effect.

ALIBI, in law, denotes the absence of the accused from the place where he is charged with having committed a crime; or his being *elsewhere*, as the word imports, at the time specified.

ALICANT, a large sea-port town in the province of Valencia and territory of Segura. It is seated between the mountains and the sea, and has a castle deemed impregnable. The port is defended by three bastions furnished with artillery. To prevent the visits of the Algerine pirates, watch-towers were built to give notice of the approach of an enemy's ship. It was taken from the Moors in 1264. The castle was taken by the English in 1706, and held out a siege of two years before it was retaken by the French and Spaniards, and at last surrendered upon honourable terms,

3 M

after

Ali
||
Alicant.

Alicata
II
Alien.

after part of the rock was blown up on which the castle stood, and the governor killed. The houses are high, and well built; and a very great trade is carried on here, particularly in wine and fruit. It is seated in the Mediterranean, on a bay of the same name, 37 miles north-east of Murcia, and 75 south of Valencia. W. Long. 0. 36. N. Lat. 38. 24.

ALICATA, a mountain of Sicily, near the valleys Mazara and Noto, upon which was situated (as is generally thought) the famous Dædalion, where the tyrant Phalaris kept his brazen bull.

ALICATA, a town of Sicily, remarkable for corn and good wine. It was plundered by the Turks in 1543; and is seated on a sort of peninsula near the sea, twenty-two miles S. E. of Girgenti. E. Long. 15. 20. N. Lat. 37. 11.

ALICATA Chlamys, was a sort of vest with sleeves, worn by the Roman boys till the age of thirteen, at which time they put on the *prætecta*.

ALIEN, in law, implies a person born in a strange country not within the king's allegiance; in contradistinction to a denizon, or natural subject. The word is formed from the Latin *alius*, "another;" *q. d.* one born in another country. An alien is incapable of inheriting lands in Britain till naturalized by an act of parliament. No alien is intitled to vote at the election of members of parliament; nor can he enjoy any office, or be returned on any jury, unless where an alien is party in a cause, when the inquest is composed of an equal number of denizens and aliens. The reasons for establishing these laws were, that every man is presumed to bear faith and love to that prince and country where he received protection during his infancy; and that one prince might not settle spies in another's country; but chiefly, that the rents and revenues of the country might not be drawn to the subjects of another. Some have thought that the laws against aliens were introduced in the time of Henry II. when a law was made at the parliament of Wallingford, for the expulsion of strangers, in order to drive away the Flemings and Picards introduced into the kingdom by the wars of king Stephen. Others have thought that the origin of this law was more ancient; and that it is an original branch of the feudal law: for by that law no man can purchase any lands but he must be obliged to do fealty to the lords of whom the lands are holden; so that an alien who owed a previous faith to another prince, could not take an oath of fidelity in another sovereign's dominions. Among the Romans, only the *Cives Romani* were esteemed freemen; but when their territories increased, all the Italians were made free, under the name of *Latins*, tho' they had not the privilege of wearing gold rings till the time of Justinian. Afterwards all born within the pale of the empire were considered as citizens.

ALIEN-Duty, an impost laid on all goods imported by aliens, over and above the customs paid for such goods imported by British, and on British bottoms.

ALIENS-Duty is otherwise called *petty customs*, and *navigation-duty*.—Fish dried or salted, and cod-fish or herring not caught in British vessels and cured by British, pay a double *aliens-duty*.—On what footing aliens are permitted to import foreign commodities into Great Britain, see *Duty*.

ALIEN-Priories, a kind of inferior monasteries, for-

merly very numerous in England, and so called from Alienation, their belonging to foreign abbeys.

ALIENATION, in law, denotes the act of making over a man's property in land, tenements, &c. to another person.

ALIENATION in mortmain, is making over lands, tenements, &c. to a body-politic, or to a religious house, for which the king's licence must first be obtained, otherwise the lands, &c. alienated will be forfeited.

ALIENATION *in fee*, is the selling the fee-simple of any land, or other incorporeal right. All persons who have a right to lands may generally alien them to others; but some alienations are prohibited: such as alienations by tenants for life, &c. whereby they incur a forfeiture of their estate. By the statute of Edward I. a bar was put to alienations by what we call *entails*, which is an expedient for procuring perpetuities in families; but counter expedients were devised to defeat this intent, and a practice was introduced of cutting off entails by fines, and of barring remainders and reversions by recoveries. The statute for alienations in Henry VIIIth's time had a great effect on the constitution of this kingdom; as, among other regulations of that reign, it tended to throw the balance of power more into the hands of the people. By the stat. 12 Car. II. cap. 24. fines for alienations are taken away. Crown lands are only alienable under a faculty of perpetual redemption. The council of Lateran, held in 1123, forbids any clerk to alienate his benefice, prebend, or the like. By the laws of the ancient Jews, lands could only be alienated for the space of 50 years. At each return of the jubilee all returned again to the primitive owners, or their descendants, to whom the lands were originally allotted at the first distribution of Canaan.

ALIENATION-Office, is an office to which all writs of covenants and entry, upon which fines are levied, and recoveries suffered, are carried, to have fines for alienation set and paid thereon.

ALIMENT (from *alo* to nourish), implies food both solid and liquid: from which, by the process of digestion, is prepared a very mild, sweet, and whitish liquor, resembling milk, and distinguished by the name of *chyle*; which being absorbed by the lacteal veins, by them conveyed into the circulation, and there assimilated into the nature of blood, affords that supply of nutrition which the continual waste of the body is found to require.—Next to air, food is the most necessary thing for the preservation of our bodies: and as on the choice thereof our health greatly depends, it is of great importance to understand, in general, what is the properest for our nourishment; and, in particular deviations from health, what is the best adapted to restore us. Our blood and juices naturally incline to become putrid and acrimonious: fresh chyle, duly received, prevents this destructive tendency, and preserves in them that mild state which alone consists with health. An animal diet affords the most of this bland nutritious mucilage; watery fluids dilute the two gross parts, and carry off what is become unfit for use. It is only the small portion of jelly which is separated from the farinaceous parts of vegetables, that, after being much elaborated, is converted into the animal nature; yet the use of vegetables prevents both repletion and a too great tendency to a putrescent acrimony of the blood.

Aliment. blood. In hot climates, as well as against the constitutional heat of particular persons, vegetables are demanded in the largest portion; animal substances afford the highest relish while our appetite continues; but will sate the appetite before the stomach is duly filled. Vegetables may be eaten after either flesh or fish: few herbs or fruits satiate so much as that the stomach may not be filled with them, when it is already satisfied with flesh or fish; whence it may be observed, that no diet which is very nourishing can be eat to fulness, because its nutritious parts are oily and satiating.—Health depends almost wholly on a proper crasis of the blood; and to preserve this a mixture of vegetables in some degree is always required, for a loathing is soon the consequence of animal food alone: hot acrid habits, too, receive from milk and vegetables the needful for correcting their excesses; but in cold, pituitous, and nervous habits, who want most nourishment from least digestion, and from the smallest quantity of food, animal diet is to be used more freely.

Thus much being offered as general principles with respect to the matter and quality of our aliment, the valetudinarian may easily regulate his diet with some advantage to himself by an attention to the few ensuing particulars. In winter, eat freely, but drink sparingly: roast meat is to be preferred, and what is drank should be stronger than at other seasons. In summer, let thirst determine the quantity to be drunk; cold stomachs never require much: boiled meats and vegetables, if not otherwise contradicted, may now be more freely used. Lax habits require the winter's diet to be continued all the year, and rigid ones should be confined to that of summer. Fat people should fast at times, but the lean should never do so. Those who are troubled with eructations occasioned by their food, should drink but little, and use some unaccustomed exercise. The thirsty should drink freely, but eat sparingly. In general, let moderation be observed; and tho' no dinner hath been had, a light supper is at all times to be preferred. After very high-seasoned meats, a glass of water acidulated with the acid elixir of vitriol, or in very weak stomachs the sweet elixir of vitriol, is far more assistant to the work of digestion than the common method of taking brandy. See further **FOOD** and **DRINK**.

Obligation of ALIMENT, in Scots law, the natural obligation on parents to provide their children with the necessities of life, &c. See **LAW**, Part III. N° clxxiii. 4.

ALIMENTARII Pueri, &c. were certain children maintained and educated by the munificence of the emperors, in a sort of public places, not unlike our hospitals.—Trajan was the first that brought up any of these *alimentary* boys. He was imitated by Adrian. Antonius Pius did the same for a number of maids, at the solicitation of Faustina; and hence, in some medals of that empress, we read *PVELLAE FAVSTINIANAE*.—Alexander Severus did the like at the request of Mammæa; and the maids thus educated were called *Mammæanæ*.

ALIMENTARY Duct or *Canal*, is a name given by Dr Tyson and some others to that part of the body thro' which the food passes, from its reception into the mouth to its exit at the *anus*; including the *gula*, stomach, and intestines. See **ANATOMY**.

This duct has been said to be the true characteristic

of an animal, or (in the jargon of the schools) *in proprium quarto modo*; there being no animal without it, and whatever has it being properly enough ranged under the class of animals. Plants receive their nourishment by the numerous fibres of their roots, but have no common receptacle for digesting the food received, or for carrying off the recrements. But in all, even the lowest degree of animal life, we may observe a stomach and intestines, even where we cannot perceive the least formation of any organ of the senses, unless that common one of feeling as in oysters. Phil. Trans. N° 269, p. 776, seq.

Dr Wallis brings an argument from the structure of the alimentary tube in man, to prove that he is not naturally carnivorous; to which Dr Tyson makes some objections. V. Phil. Trans. N° 269, p. 777.

ALIMENTARY Law, *lex alimentaria*, was an old law among the Romans, whereby children were obliged to find sustenance for their parents.

ALIMONY, in law, implies that allowance which a married woman sues for, and is intitled to, upon any occasional separation from her husband. See **LAW**, Part III. N° clx. 13.

ALIPILARIUS, or **ALIPILUS**, in Roman antiquity, a servant belonging to the baths, whose business it was, by means of waxen plasters, and an instrument called *volsella*, to take off the hairs from the arm-pits, and even arms, legs, &c. this being deemed a point of cleanliness.

ALIPTERIUM, *αλειπτήριον*, in antiquity, a place in the ancient *palestræ*, where the *athletæ* were anointed before their exercises.

ALIQUNT PART, in arithmetic, is that number which cannot measure any other exactly without some remainder. Thus 7 is an aliquant part of 16; for twice 7 wants two of 16, and three times 7 exceeds 16 by 5.

ALIQUNT PART, is that part of a number or quantity which will exactly measure it without any remainder. Thus 2 is an aliquot part of 4; 3 of 9; 4 of 16, &c.

ALISANDERS, or **ALEXANDERS**, in botany. See **SMYRNIUM**.

ALISMA, or **WATER-PLANTAIN**: A genus of the polygynia order, belonging to the hexandria class of plants; and in the natural method ranking under the 5th order, *Tetrapetaloidæ*. The characters are: The *calyx* is a three-leaved perianthium: The *corolla* consists of three roundish, large, flat, expanding petals: The *stamina* consist of six subulated filaments shorter than the corolla; the antheræ are roundish: The *pistillum* consists of more than five germina; the styli are simple, the stigmata obtuse: The *pericarpium* consists of compressed capsulæ: The *seeds* are small and solitary. Of this genus there are eight

Species, viz. The plantago, or great water-plantain, which grows in all the marshy parts of this country; the ranunculoides, or lesser water-plantain; the natans, or creeping water-plantain; the damasonium, or star-headed water-plantain; all which are natives of Britain. The others, viz. the flava, cordifolia, subulata, and parnassifolia, are natives of America, where they are generally found in stagnating waters, and other swampy places; so that it would be difficult to preserve them in Britain, for they will not live in the

Alisontia
||
Alkali.

open air, and they require a bog to make them thrive: but as they are plants of no great beauty or use, it is not worth while to cultivate them in this country.

ALISONTIA, or ALISUNTIA, (anc. geog.); a river of Belgic Gaul, now *Alfitz*; which rising on the borders of Lorrain, and running through the duchy, waters the city of Luxemburg, and, swelled by other rivulets, falls into the Sur.

ALITES, in Roman antiquity, a designation given to such birds as afforded matter of auguries by their flight.

ALKADARII, a sect among the Mahometans who deny any eternal, fixed, divine decrees, and are asserters of free-will. The word is formed from the Arabic *alkadar*, which signifies "decree." The Alkadarii are a branch of Motazalites, and stand opposed to the Algiabarii. See ALGIABARII.

ALKAHEST, or ALCAHEST, in chemistry, an universal menstruum capable of resolving all bodies into their first principles. Van Helmont pretended he was possessed of such a menstruum; but, however credulous people might be imposed on in his days, the notion is now become as ridiculous as the philosopher's stone, the perpetuum mobile, &c.—It is likewise used by some authors for all fixed salts volatilized.

ALKALI, in chemistry, one of the general divisions of salts, comprehending that class of chemical elements which, by their union with acids, form *perfect neutrals*, in opposition to the salts formed of acids with metals or earths, which are called *imperfect*.

Alkaline salts are divided into two kinds, the fixed and volatile; and the former into two species, vegetable, and mineral or fossil. All of these possess some properties in common, and some peculiar to each. Those which they have in common are, 1. An acrid and pungent taste, which, when the salts are very pure and strong, degenerates into absolute causticity, and would entirely destroy the organ of sensation if long applied to it. 2. A tendency to dissolve animal substances, and reduce them to a gelatinous substance, which all of them will do when very strong. 3. An attraction for acids, with a power of separating earths and metals from them, though previously combined with the same. 4. They change the blue vegetable juices to green; the green to yellow; the yellow to orange; the orange to red; and the red to purple. 5. They unite with oils, and destroy or cause to fade almost all kinds of colours that can be put upon cloth, whence their use in bleaching, &c.

The properties common to both kinds of fixed alkalis are, 1. They resist the action of fire to a great degree, so that they can easily be reduced to a solid form by evaporating any liquid in which they happen to be dissolved. 2. By an intense fire, they flow into a liquid which concretes into an hard and solid mass in the cold. 3. When mixed in certain proportions with those earths or stones called *vitriifiable*, they melt, in a heat still more intense, into glass. 5. Mixed with ammoniacal salts, with animal substances, or with foot, they extricate a volatile alkali.

The volatile alkali differs from the other two in being unable to resist the fire, and being entirely resolvable into an invisible and permanently elastic fluid, called by Dr Priestley *alkaline air*. In consequence of this volatility, it always affects the olfactory nerves

very perceptibly, and its smell is the general criterion by which its strength may be judged of. Its attraction for acids, power of changing colours, &c. are also considerably weaker than those of the fixed alkalis.

Though two sorts of volatile alkali are commonly sold under the names of spirits of hartshorn and of sal-ammoniac, the one differs from the other only in its degree of purity. The former is so called from its being originally made from the horns of deer; but this material has long been laid aside, and the bones of horses, the *flints*, as they are called, of the horns of cattle, the parings of hoofs, &c. have been substituted in their stead. This kind, however carefully prepared, always contains a portion of animal oil, the smell of which is very perceptible; the other, prepared from pure sal ammoniac, is totally free of any empyreumatic smell, and is as pure as it can be obtained by any means whatever.

Effervescence with acids was formerly supposed to be a distinguishing property of alkalis, though it was always known that by a mixture with quicklime they might be deprived of this property. Dr Black, however, has shown, that the effervescing with acids is no property of pure alkali, but is occasioned only by the escape of fixed air from it: of consequence, when quicklime is added, which attracts the whole or greatest part of the fixed air, no effervescence can be perceived. In the state in which the fixed alkalis are commonly met with, indeed, effervescence with acids may be said to be an essential property; but this is entirely owing to the cause just mentioned, *viz.* a quantity of fixed air, to which they are united during the process by which they were originally formed. The quantity of this air, however, is never so great as to saturate them entirely; on the contrary, their alkaline properties are always very perceptible, and they are commonly said to be in a *mild* state. But the truth is, that now they are in a kind of intermediate state between what may be called perfectly mild and perfectly caustic. In their perfectly mild state, they are united with such a large quantity of fixed air as entirely overpowers their alkaline properties; and therefore they are no more intitled to the name of alkalis in this state, than when combined with the marine, nitrous, or any other acid; in which case the compounds are called neutral salts. But it is a much more laborious and tedious process to saturate an alkali completely with fixed air than with any other acid; nor does it very easily retain the aerial acid after it has once been combined with it. Hence the caustic taste and properties of the alkali almost always predominate, and the salt contains a portion of pure and caustic alkali, to which alone its virtues are to be ascribed.

Vegetable alkali is obtained in its greatest purity by deflagrating nitre with charcoal, provided we make use of no more of the latter than is barely sufficient to destroy the nitrous acid. It is, however, a very difficult matter to adjust this proportion with sufficient accuracy; for if we employ too much charcoal, the salt will be considerably phlogisticated; if too little, some part of the nitre will remain undecomposed. Burnt tartar, therefore, purified by solution and filtration, may be looked upon as the best alkali we have. The common alkalis, or *ashes* as they are called, and said to be obtained from the ashes of vegetables, are always mixed

Alkali.

Effervescence with acids not a characteristic of alkali.

Properties common to all the alkaline salts.

Properties common to the two fixed alkalis.

Of the volatile alkali.

Preparation of the vegetable alkali.

Alkali. ed with much phlogiston, and sometimes with lime, salt, or other heterogeneous matters; for which reason they are not to be employed in the nicer chemical experiments, without being purified by solution in water, by filtration, and crystallization. The purest of all these salts is that called the *blue pearl*, imported from Hungary.

6
Its peculiar
properties.

The vegetable alkali when thus purified, and containing near one-half its weight of fixed air, is of a white colour when dry, with a very hot and caustic taste, possessing in an eminent degree all those qualities which have been ascribed to the alkaline salts in general. It runs *per deliquium* when exposed to the air; and is usually incapable of being crystallized, though it acquires this property after being employed in the rectification of ardent spirit. It adheres more closely to acids than any substance hitherto discovered; though, from some experiments, Bergman was induced to believe that pure terra ponderosa attracted acids still more powerfully. But this has been discovered to be a mistake by Dr Withering, who, in a paper published in the 74th volume of the Philosophical Transactions, shows, that unless where the earth is united with vitriolic acid, not only the vegetable, the fossil, but even the volatile alkali in its pure or caustic state, will separate it from any other with which it may be combined. Terra ponderosa, therefore, will always decompose vitriolated tartar, Glauber's salt, or vitriolic ammoniac; whence the mistake of this celebrated chemist probably has proceeded. After this alkali has been once united with marine acid, it appears to have undergone some change; for the salt then produced, by combining it with the vitriolic acid, resembles Glauber's salt almost as much as it does vitriolated tartar. It seems therefore to have made some approach towards the nature of fossil alkali; but chemists have not inquired what would be the consequence of repeated combinations of this kind.

7
Of the fos-
sil alkali.

The fossil alkali differs from the vegetable in having a smaller attraction for acids, in being more easily fusible by itself, and forming a more soluble compound with the vitriolic acid. It is also easily crystallizable, even without the addition of more fixed air than it naturally contains: and experience has determined it to be more proper for glass or soap manufactures than the vegetable alkali; for which reason the demand for it is very considerable.

8
This alkali
known to
the an-
cients.

The fossil alkali was anciently called *natron* or *nitre*, and is spoken of by Pliny and Tacitus as an ingredient in glass, &c. and the scriptures inform us that it was used in baths. The knowledge of this salt was lost in the general obscuration of science which took place on the decline of the Roman empire; nor do we find it mentioned till the time of the Hon. Robert Boyle; and, even since that time, though M. du Hamel gave an accurate account of it in a memoir for the year 1736, little farther notice was taken of it till very lately.

9
Found na-
tive in ma-
ny parts of
the world.

We are now certainly informed that the fossil alkali is found native in many parts of the world, which never is the case with the vegetable alkali. The places where it abounds most are, Egypt, the country of Tripoli in Barbary, the peak of Teneriffe in one of the Canary islands, Hungary, several of the provinces of Russia, some parts of Asia, particularly the neighbour-

hood of Smyrna, &c. though it has not hitherto been found in any of the western countries of Europe, excepting in the neighbourhood of volcanoes, or in mineral waters; and in these last only in very small quantity.

The great source of the mineral alkali, however, and from whence it is not improbable that the places already mentioned have been supplied by some unknown natural operation, is the water of the ocean. Fossil alkali is the natural basis of sea-salt; and could any method of readily procuring it from this salt be fallen upon, it would no doubt be a most valuable secret. Hitherto, however, all the methods used with any success by the chemists may be reduced to two. 1. By mixing the nitrous acid with sea-salt in a retort, in the proportion, according to Dr Vogel, of four of the acid to one of the salt, and distilling off the muriatic acid, or rather aqua regia, which will be produced in the process. The residuum will afford a cubical nitre by crystallization, from whence the alkali may be obtained pure by deslagrating with charcoal. 2. By addition of vitriolic acid the spirit of sea-salt will be expelled much more easily, and at a cheaper rate, than by the nitrous acid. The residuum affords Glauber's salt in great plenty: this being melted in a crucible with a sufficient quantity of charcoal-dust, forms a hepar sulphuris; which being decomposed by means of the vegetable acid, the latter may be destroyed by force of fire, and the alkali obtained in purity. For a further explanation of both these methods, see the article *CHEMISTRY-Index*.

The demand in this country for fossil alkali is supplied from the ashes of kali and other sea-plants, from which it is separated in the same manner as the vegetable alkali from the ashes of other plants. The purest kind of ashes containing this salt is called *soda* or *barilla*, and is imported chiefly from foreign countries; that which is obtained from the sea-weed growing on our own coasts, and known by the name of *kelp*, is excessively impure, and scarce admits of being thoroughly analysed according to the rules of chemistry.

Both these alkalis may be deprived of their fixed air, and thus rendered pure and caustic, by the addition of quicklime. In this state the difference between them is much less perceptible than in any other, though the addition of fixed air, or any other acid, always shows that no essential change has taken place in either. In this highly caustic state they destroy the parts of animals in a manner similar to that of fire; whence they are called *potential* cauteries, as the former is called the *actual* cautery. M. Morveau informs us, that on digesting a piece of beef in a solution of caustic vegetable alkali, the liquor soon became red, and the flesh assumed the form of a semitransparent jelly, in which, however, one could easily perceive the ramifications of the smallest fibre; and, after standing some months, it emitted but very little smell. The vegetable alkali is commonly made use of as the material for the common caustic or *lapis infernalis* of the shops; for the preparation of which, see *CHEMISTRY-Index*. Both alkalis attract moisture from the air when reduced to a solid form in their caustic state, though neither the fossil alkali nor its combinations do so in any other case. In their caustic state also they only unite with oils, or dissolve in spirit of wine; which last they

Alkali.

10
Is the basis
of common
salt.

11
Properties
of both fix-
ed alkalis
when cau-
stic.

Alkali.

they have been supposed to purify, though it is more than probable that they decompose and communicate disagreeable qualities to it.

12
Volatile alkali in its mild and caustic states.

The volatile alkali, when procured immediately by the distillation of any substance capable of yielding it, is obtained in a state similar to that in which the alkalis are usually met with, viz. half mild and half caustic. By exposing the liquid alkali to a great quantity of fixed air, we may at last have it perfectly mild and neutralised; in which state it appears as a white salt extremely volatile, though less so than the pure caustic alkali. It dissolves very readily in water; but unless some caustic spirit, or some lime or fixed alkali be added, in order to abstract part of the fixed air, it will scarcely exhibit the characteristic of volatile alkali, viz. a pungent and urinous smell. The addition of fixed air, however, makes very little difference with regard to the chemical combinations of this salt; for as fixed air has a very slender power of acidity, it is expelled by every other acid with the greatest ease, and the same combinations formed as though it had not been present. The only difference is, that when a mild alkali is added to an acid, a strong effervescence takes place by reason of the escape of the fixed air through the liquid, while with the caustic alkali the mixture is made quietly and without disturbance.

The various combinations of the alkaline salts with the different acids, and the neutral compounds thence resulting, are exhibited in the following table.

1. Vegetable fixed alkali combined with

Vitriolic acid	} forms	Vitriolated tartar.
Nitrous acid		Nitre.
Marine acid		Sal digestivus.
Acetous acid		Terra foliata tartari.
Acid of tartar		Soluble tartar.
Acid of borax,		{ Anomalous salts, whose
Acid of phosphorus,		
Saccharine acid, &c.		properties have not
Aerial acid		been ascertained.
		Mild or aerated alkali.

2. Fossil or mineral fixed alkali combined with

Vitriolic acid	} forms	Glauber's salt.
Nitrous acid		Cubical nitre.
Marine acid		Common salt.
Acetous acid		A salt resembling terra
		foliata tartari, but which
		does not deliquesce.
Acid of tartar		Rochelle salt.
Acid of borax		Borax.
Acid of phosphorus,		{ Unknown salts.
Saccharine acid, &c.		
Aerial acid		Mild fossil alkali.

3. Volatile alkali combined with

Vitriolic acid	} forms	Vitriolic ammoniac, or
		Glauber's secret sal
		ammoniac.
Nitrous acid		Nitrous ammoniac, or
		volatile nitre.
Marine acid	{	Common sal ammoniac.
Acetous acid		Spiritus mindereri.

Volatile alkali combined with

Acid of tartar

Acid of borax

Acid of phosphorus

Saccharine acid, &c.

Aerial acid

A salt whose properties have not been investigated; which shoots into fine long crystals, and does not deliquesce in the air.

An anomalous salt.

Microcosmic salt, or essential salt of urine.

Anomalous salts.

Volatile sal ammoniac, or salt of hartshorn.

Besides their attraction for acids, the alkalis have also an attraction for oils, sulphur, and spirit of wine, in the moist way, when the salts are deprived of their fixed air; and in this, as well as the dry way, with several metals, and vitrifiable earths and stones, as has been already mentioned.

With oil the vegetable fixed alkali forms a soap, though less perfect than that made with the caustic mineral alkali. When combined with fixed air they scarcely unite with oils. Boiled with sulphur, or melted with it in their dry state, they unite into a very fetid compound called *hepar sulphuris*, which is soluble in water, but totally and very quickly decomposed by the contact of air. Vegetable alkali unites with iron, tin, and zinc; corrodes copper, and runs with it into a liquor of a deep blue colour, and joins with lead in fusion. It does not act upon gold in its metallic state; but if a sufficient quantity be added to a solution of gold in aqua regia, the calx of the metal will be first precipitated and afterwards dissolved.

Vegetable alkali is a principal ingredient in the powders called *fluxes*, used for the fusion of metalline ores. It promotes the fusion of earths, and forms glass with the crystalline kind. It is soluble in an equal weight of distilled water; and when exposed to the air, it soon attracts moisture from it and flows into a liquid. In its caustic state it dissolves in spirit of wine, and forms with it a red tincture called *Van Helmont's tincture of salt of tartar*, formerly used both as an internal and external remedy, but now fallen into disrepute.

Fossil alkali, in its caustic state unites with oil into an harder soap than that made with vegetable alkali. With sulphur it forms a *hepar sulphuris* in the same manner as the vegetable alkali, and yields a tincture with spirit of wine, which dissolves part of the salt whilst hot, but lets it fall again in a crystalline form when cold. Gold, silver, or quicksilver, are not affected by a solution of this salt; but copper and tin are dissolved by it in the open air. It affects tin, lead, regulus of antimony, and cobalt, slightly; but acts powerfully upon zinc, and forms a kermes mineral with crude antimony. Copper, iron, bismuth, zinc, antimony, and regulus of cobalt, fused with two parts of fossil alkali, are almost entirely dissolved in a very strong heat; but tin, lead, and regulus of antimony, treated in the same manner, only suffer a partial solution.

All the alkalis are of considerable use in medicine, though

13

Attractions of the alkalis for various substances.

Alkali.

14
Medical
virtues of
alkaline
salts.

though the particular virtues of vegetable and fossil alkali have not hitherto been properly ascertained. It is probable, however, that there must be a considerable diversity in their operations on the human body, as the vegetable alkali shows itself so much more acrid and powerful than the fossil. As both of them unite immediately with acids, and change them into mild neutral salts; hence, if any of the strong mineral acids should fall upon any part of the human body, and begin to corrode and give pain, the immediate application of the lixivium tartari, or of a solution of any of those alkaline salts in water, or of the salts themselves in powder, will destroy their causticity, and prevent their doing farther mischief: Or if any of these acids should drop on clothes, linen, or other substances, and alkaline salts are immediately applied, they will neutralize the acid, and prevent its further corrosion: Or if a person should, through mistake, swallow any of the mineral acids, or corrosive sublimate, or any other corroding salt which an alkali will decompose, the taking down into the stomach solutions of the alkaline salts, or the salts themselves in proper doses, are the most likely means of affording relief, if not given too late (A).

Both the vegetable and fossil alkali applied externally in a caustic state, first irritate and inflame the skin, and afterwards act as fire in mortifying and destroying it; and therefore have been much used by surgeons for opening buboes and other abscesses, and for eating away proud or fungous flesh that sprouts out from sores. Various formulæ of caustic alkalis have been employed for these purposes, of which an account is given under CHEMISTRY and PHARMACY.

The alkaline salts, when much diluted with water, have been used as washes for removing pimples from the face; but if such washes are continued long, they are apt to spoil the skin. The ancients often used to dissolve natron (the fossil alkali) in their baths, and esteemed such baths useful for removing itchings of the skin, the scab, the impetigo, leprosy, and almost all sorts of cutaneous eruptions; and they employed baths of the same kind for promoting sweat, and for curing various disorders. They mixed it likewise with turpentine, with oils, and with stuffs of various kinds, and rubbed or applied such compositions to the skin, for removing different complaints, to heal sores, to strengthen weak or relaxed parts, to destroy the poison of the bite of a mad dog, and of serpents; and they esteemed it as an antidote against many other poisons.

15
Do not act
as antiseptics when
taken into
the human
body.

It has been proved that alkaline salts preserve animal substances from putrefaction; on which account some practitioners have concluded that they act as strong antiseptic remedies when swallowed as medicines, and are taken up by the lacteal vessels, and by them carried to the subclavian vein to be mixed with the blood. Experience, however, has shown that they have effects directly opposite, and that by stimulating the vessels and quickening the circulation, they contribute towards

the dissolution of the vital fluid; of which Dr Monro says he has seen several instances.

Alkali.

Alkalis promote the secretions in general, particularly by the kidneys; but by the help of warm liquors and bed-clothes, their operation may be directed towards the skin. They have also been employed in cases of heartburn, and others where an acid prevails in the stomach and bowels, or where these organs are loaded with viscid phlegm. They are likewise given with a view to assist the operation of the bile when it is too weak and inert, either by themselves, or mixed with purgative or other medicines. The fossil alkali has been alleged to be a more powerful solvent of the human calculus than the vegetable, though perhaps without any just foundation. It is given from 5 to 20 grains three times a-day; and in some cases even to double that quantity. It may be taken in any common liquor, or in clear broth made of lean meat, from which the fat has been skimmed off; or the powdered salts may be made up into pills or boluses mixed with liquorice powder, by means of mucilage of gum Arabic or conserve.

The vegetable alkali has long been used as a diuretic in dropsies with great success; and Dr Monro informs us, that he has seen a number of cases of anasarca in which the water was carried off by it. As diuretics, it may be taken from ten grains to half a drachm, or more, two or three times a-day, mixed with some distilled water, syrup, broth, or water-gruel, or with two ounces of white-wine, which partly neutralizes the salt. When added to infusions of juniper-berries, broom-tops, horse-radish, mustard-seed, winter's-bark, &c. in wine and beer, they prove powerful diuretics; and Dr Monro gives the following formula.

“Take broom-tops, horse-radish, and juniper-berries, of each an ounce; bruise them in a stone or marble mortar; put them into a large wide-mouthed bottle, and add to them an ounce of salt of tartar and two quarts of Rhenish wine. Infuse them for four days; decant off the wine, and filter it through paper for use. Two or three ounces may be taken three or four times a-day.”

Or, “Take an ounce of canella alba, and as much mustard-seed and juniper-berries; bruise them well in an iron mortar, and add an ounce of purified vegetable alkali with two quarts of porter: infuse for four days, and filter the liquor through paper; let the patient take a wine-glass full every four or six hours.”

The diuretic powers of these medicines are sometimes increased by opium, and they have been successfully joined with essential oils and balsams.

The most remarkable property of these salts, however, is that of dissolving the human calculus; for the discovery of which, Mrs Stephens, in the year 1740, obtained a parliamentary reward of L. 5000. At that time Dr Jurins being afflicted with the stone, tried a number of experiments on these medicines; from which he concluded, that their efficacy depended entirely on the

16

Are of considerable
use in dropsies.

17

An excellent solvent
of the stone.

(A) With regard to the mineral acids, an exception seems to take place if oil of vitriol in its concentrated state should happen to be swallowed; for this contracts such a degree of heat on the contact of any aqueous fluid as would destroy the patient, independent of another cause. An instance we have seen where a person unhappily mistook a bottle of oil of vitriol for water in the night-time. He recovered by swallowing instantly a great quantity of milk. Another recovered by drinking a bottle of Florence oil.

Alkali.

the alkaline salts and lime which they contained; and therefore he began to try what effects a soap-ley would have on himself. At first he took only a few drops, but gradually increased his dose till he came to an ounce, and sometimes an ounce and a half, in a proper vehicle, in 24 hours. This produced the discharge of some small calculi, and relieved him of the symptoms of the stone. Dr Hartley, likewise, laboured under this complaint; and believing that the efficacy of Mrs Stephens's medicines depended on the soap, lime, and alkaline salts which they contained, ordered a paste to be prepared for himself, made of eight ounces of soap, one of oyster-shell lime, a drachm of salt of tartar, and as much water as formed the whole into a soft mass; of which he took large quantities, and found himself greatly relieved, though not cured, as a stone was found in his bladder after his death. These and other instances of success, soon brought the medicines into general use: but though many found relief from them, others, particularly those who were afflicted with the stone, had all the symptoms of their distemper aggravated by the salts rendering the blood, and other liquors of the body, particularly the urine, sharp and acrid, so as to irritate and inflame the bladder, which was already in too irritable a state, from the constant friction of the calculus lodged within it. The late experiments of Mr Scheele and Sir Torbern Bergman, however, have made it evident, that the human calculus is composed of a concrete acid joined to a small portion of animal earth. Most people, therefore, who are afflicted with the stone or gravel, wish to try the efficacy of these remedies, rather than submit to the dangerous operation of lithotomy; we shall therefore subjoin, from Dr Monro, the following directions for making and using the soap-ley.

18

Monro's
directions
for making
and using
the soap-
ley.

"Take of salt of tartar, eight ounces; of fresh quicklime, four ounces; of distilled water a quart: mix them all well together in a large bottle, and let them stand for 24 hours; then pour off the ley and filter it through paper, keeping it in well-stopped vials for use. Of this the dose is from 30 drops to three or four drachms, which is to be repeated two or three times in the day.

"One of the best methods of taking this ley is, to mix the quantity to be used in the day with three pints of plain broth, which has been made with the lean part of veal, with all the fat or oily parts separated from it, by putting it, when made, into a large bowl, and skimming them off with a spoon when cold, and to drink, within an hour, a pint of this broth three times in the day—early in the morning—at noon—and in the evening; and to continue the use of this medicine for three, four, or more months; and, during this course, to live on such things as least counteract the operation of the medicine: to take for breakfast some plain broth, such as has been described, with dry toasted bread or biscuit; or a dish or two of tea or coffee in place of the broth: for dinner, to eat the lean part of plain boiled or roasted meat, or a fowl, with their own gravy or juice for sauce; and to eat only of vegetables which contain but little acid, such as potatoes, &c. and to use for drink toast and water, or water with a very small portion of spirit in it; and to abstain from eating fruit and acerbent vegetables, fat meat, butter or oil; and from drinking wine, beer, cyder, punch, and in short from

N^o 12.

taking any thing which is likely to counteract or destroy the effects of the ley."

With regard to the use of the soap-ley, our author observes, "that he has seen a number of people who have taken it, both for gravelly complaints and for the stone; that many of those who had gravel were relieved, and some of them seemed to be cured; that some few of those who had the confirmed stone, received considerable relief for a time from its use: but the complaints afterwards returned; nor can he say that one complete cure was made; though from the accounts given by the late Dr Whytt of Edinburgh, and others, it should appear that this had sometimes happened: that in many cases of stone the ley occasioned pain and irritation, and increased the violence of the symptoms so much, that the patients were obliged to lay it aside; and that this happened most frequently where the bladder seemed to be already diseased from the irritation of the stone: that at all times it is advisable to lay aside this medicine, at least for a time, whenever it irritates and occasions pain, or where there are appearances of its continued use having broken down the crasis of the blood.

Instead of the soap-ley, the following solution of Aerated vegetable alkali, fully saturated with fixed air, has been lately recommended as a powerful solvent of the stone. 19

"Take two ounces of salt of tartar, and dissolve it in two quarts of distilled water, and then saturate it fully with fixed air; and let the patient take eight ounces of it every eight hours. But though many cases have been related in which this medicine is said to have been serviceable, our author says he has seen only one gentleman who had taken it, and who had found considerable relief from it. Soap-ley has likewise been recommended as a solvent of bilious calculi, and has sometimes been of service; but this has probably arisen more from its property of dissolving thick and viscid humours, and assisting the action of the bile, than by acting on the calculi themselves.

The volatile alkali has many of the virtues of the Medical fixed, but affects animal substances, particularly in its caustic state, less powerfully than they do. It gives a brisk and strong stimulus to the nerves and fibres of living animals; and is therefore employed in diseases where the pulse is low and the circulation too languid; in low fevers, where the patient is in danger of sinking; in apoplectic and lethargic disorders of elderly people of phlegmatic habits, in paralytic cases, fainting fits, &c. where a brisk and stimulating remedy is wanted. It is often used as a diaphoretic and sudorific in cases of rheumatism, in the end of fevers, catarrhs, and other diseases, where a plentiful diaphoresis or sweat is required; and, according to our author, it is principally owing to this quality that the alkalis have obtained their reputation of being efficacious remedies against the bites of serpents and other venomous animals. It is equally efficacious against mineral acid poisons with the fixed alkali. 20

It now remains only to give some account of the origin of the alkalis, or that process by which they are naturally produced. This subject, however, is very much involved in obscurity; nor has the origin of fixed alkalis, at least, been investigated with such diligence and success as that of the acids. Chemists have been divided in their opinions, whether alkaline salts be natural

Alkali.

19
Aerated vegetable alkali recommended.

20
Medical virtues of the volatile alkali.

21

Alkali.

tural bodies, or formed by the force of fire, uniting the principles of which they consist in the burning or distilling the substances from which they are got. It is generally supposed that they are formed by the force of fire intimately uniting an earth, an acid, and an inflammable matter together, so as to form an alkaline salt, which is supposed to be composed of these principles. In support of this opinion, it has been alleged, 1. That the fixed vegetable alkali is produced by burning vegetables which contain the principles fit for forming these salts; though no vestige of an alkali can be discovered in these vegetables in their natural state. 2. That the essential salts of vegetables, which contain an acid and an earth, on being calcined in a crucible with charcoal, yield an alkaline salt. 3. That by alternately allowing the vegetable alkali to run per deliquium, and drying it again, it precipitates a quantity of earth every time it is dissolved; so that the whole of the salt is at last reduced to this kind of earth, while the acid, phlogiston, &c. have evaporated, or been destroyed by the repeated application of heat for drying the salt. 4. In like manner the volatile alkali is produced by distilling animal substances which contain the principles fit for producing it, though no marks of a volatile alkali could be discovered in these substances while they were fresh.

On the other hand, it has been asserted, that the alkaline salts obtained by burning vegetables or distilling animal substances, existed originally in the materials from which they are procured; that they were generated in the plants by the process of vegetation, and freed by the fire from the other principles which disguised them. In support of this opinion the following arguments are made use of by Messrs Weigleb, Rosenstiel, Morveau, &c. 1. That they had not been able to procure an alkaline salt by mixing earths, oil, and acids together, and subjecting them to the most intense fire. 2. The crystals of tartar, which were formerly believed to be pure acid salts, have been found by late experiments to contain a vegetable alkali. 3. The vegetable alkaline salt, when purified, is always of the same nature, from whatever substance it is procured; and therefore must have an original principle or body existing in the vegetables from which it is procured: for had it been produced by art, it would have varied, and we should have had different species of it, according to the principles which the plants contained. And, 4. The neutral salts which have been found mixed with the ashes of plants, as vitriolated tartar, nitre, and sea-salt, are likewise strong proofs of the original existence of alkali in vegetables.

On this subject Dr Monro observes, that hitherto we have not sufficient evidence to determine positively whether the vegetable alkali be produced by the force of fire, or if it existed originally in the substances from which it is prepared, though he is inclined to favour the former opinion. With regard to the volatile alkali, however, we have abundant evidence of its being produced from substances which could not possibly be supposed to contain it originally. Dr Stahl assures us, that if any dry fixed alkaline salt be well rubbed in a mortar with such a quantity of oil of turpentine as is sufficient to make it of the consistence of a pulp, and digested for some weeks in a cucurbit or retort, we obtain a volatile alkali. Mr Geoffroy relates, that having

VOL. I. Part. II.

placed a large retort in a sand furnace, and adapting a tubulated receiver to it, afterwards heating the bottom of the retort red hot, he put into it, by means of a long tube rising from the upper part of the neck, a powder composed of equal parts of nitre and charcoal, on which there came over into the receiver a liquor highly impregnated with volatile alkali. Cartheuser, in the first volume of his *Materia Medica*, tells us, that if two parts of salt of tartar be mixed with one of sulphur, and be afterwards distilled, they yield a volatile alkaline salt and spirit. Boerhaave and Macquer have both affirmed, that the vegetative process itself produces a volatile alkali; and that the juices got by bruising mustard-seed and other alkalescent vegetables, as they are called, contain a volatile alkali which effervesces with acids: but this is denied by Cartheuser and Vogel, who affirm that they could discover no traces of volatile alkali in these juices by any experiments they made.

But whatever may be concluded from the experience of former chemists, the late discoveries of Dr Priestley and Mr Cavendish have decisively shown, that the volatile alkali is by no means a simple element or natural principle, but a compound, and which may be artificially prepared. Dr Priestley informs us, that by the union of nitrous air with iron, a volatile alkali is generated; and Mr Cavendish, that by the action of the electric fluid, or pure elementary fire, upon phlogisticated air, the nitrous acid is produced: the volatile alkali, therefore, must be supposed to consist ultimately of phlogisticated air united to a great quantity of elementary fire. In like manner, if we can suppose this subtle element to enter into the substance of any kind of earth in such a manner as to exert its peculiar action when that substance is applied to any other, we may reasonably conclude that the fixed alkalis also are not simple and permanent principles, but capable of artificial composition and decomposition. It is certain that the action of alkaline salts is extremely similar to that of fire; and as we know that this element is combined in a *latent* state with fluids, there can be no absurdity in supposing it capable of combining also with solids.

ALKALI, or *Sal Kali*, in botany. See SALICORNIA.

ALKANET, in botany. See ANCHUSA.

ALKEKENG, in botany, the trivial name of a species of physalis. See PHYSALIS.

ALKENNA, in botany. See LAWSONIA.

ALKERMES, in pharmacy, a compound cordial medicine made in the form of a confection, deriving its name from the kermes-berries used in its composition.

ALKORAN. See ALCORAN.

ALL-HALLOWE. See ALL-SAINTS.

ALL-GOOD. See CHENOPODIUM.

ALL-HEAL. See HERACLEUM and STACHYS.

ALL-SAINTS, in the calendar, denotes a festival celebrated on the first of November, in commemoration of all the saints in general; which is otherwise called *All-Hallows*. The number of saints being so excessively multiplied, it was found too burdensome to dedicate a feast-day to each. In reality, there are not days enough, scarce hours enough, in the year, for this purpose. Hence an expedient was had recourse to, by commemorating such in the lump as had not their own days. Boniface IV. in the ninth century, introduced the

Alkali
||
All-Saints.

See *Aerology*, n^o 149.

See *Acid*, n^o 7.

All-Saints the feast of *All Saints* in Italy, which was soon after adopted into the other churches.

Bay
||
Allatius.

ALL-SAINTS Bay, a spacious harbour near St Salvador in Brazil, in S. America, on the Atlantic Ocean. W. Long. 40. S. Lat. 12.

ALL-Souls, in the calendar, denotes a feast-day, held on the second of November, in commemoration of all the faithful deceased.—The feast of All-Souls was first introduced in the 11th century, by Odilon abbot of Cluny, who enjoined it on his own order; but it was not long before it became adopted by the neighbouring churches.

ALL-SPICE. See MYRTUS and CALYCANTHUS.

ALLA, or *ALLAH*, the name by which the professors of Mahometanism call the *Supreme Being*.

The term *alla* is Arabic, derived from the verb *alah*, to adore. It is the same with the Hebrew *Eloah*, which signifies the *Adorable Being*.

ALLAMANDA, in botany: A genus of the monogynia order, belonging to the pentandria class of plants. The characters are: The *calyx* is a five-leav'd perianthium: The *corolla* consists of one funnel-shaped petal; the tube cylindric; the border semiquinquefid and ventricose; the divisions expanding and obtuse: The *stamina* have scarce any filaments; the antheræ are five, arrow-shaped, converging, in the throat of the tube: The *pistillum* has an oval germin, girt at the base with an annular margin; the stylus is filiform, the length of the tube; the stigma is headed, and contracted in the middle: The *pericarpium* is an orbicular, compressed, bristly capsule, containing one cell with two valves: The *seeds* are imbricated, orbicular, flat, with a membranaceous wing on the margin, and are very numerous. There is but one species, the *cathartica*, a native of Surinam.

ALLANTOIS, or *ALLANTOIDES*, a gut-shaped vesicle investing the fœtus of cows, goats, sheep, &c. filled with an urinous liquor conveyed to it from the urachus.—(See *COMPARATIVE Anatomy*). Anatomists are not agreed whether the allantois has any existence in the human species or not.

ALLATIUS (Leo), keeper of the Vatican library, a native of Scio, and a celebrated writer of the 17th century. He was of great service to the gentlemen of Port Royal in the controversy they had with M. Claude touching the belief of the Greeks with regard to the eucharist. No Latin was ever more devoted to the see of Rome, or more inveterate against the Greek schismatics, than Allatius. He never engaged in matrimony, nor was he ever in orders; and Pope Alexander VII. having asked him one day, why he did not enter into orders? he answered, "Because I would be free to marry." The pope rejoined, "If so, why do you not marry?" "Because," replied Allatius, "I would be at liberty to take orders." Thus, as Mr Bayle observes, he passed his whole life, wavering betwixt a parish and a wife; sorry, perhaps, at his death, for having chosen neither of them; when, if he had fixed upon one, he might have repented his choice for 30 or 40 years.—If we believe John Patricius, Allatius had a very extraordinary pen, with which, and no other he wrote Greek for 40 years; and we need not be surprised, that, when he lost it, he was so grieved, that he could scarce forbear crying. He published several manuscripts, several translations of Greek authors,

and several pieces of his own composing. In his compositions he is thought to show more erudition than judgment: he used also to make frequent digressions from one subject to another. He died at Rome in 1669, aged 83.

ALLAY. See *ALLOY*.

ALLEGATA, a word anciently subscribed at the bottom of rescripts and constitutions of the emperors; as *signata*, or *testata*, was under other instruments.

ALLEGES, or *ALLEGIAS*, a stuff manufactured in the East Indies. There are two sorts of them; some are of cotton and others of several kinds of herbs, which are spun like flax and hemp. Their length and breadth are of eight ells, by five, six, or seven-eighths; and of twelve ells, by three-fourths or five-eighths.

ALLEGIANCE, in law, is the tie, or *ligamen*, which binds the subject to the king, in return for that protection which the king affords the subject. The thing itself, or substantial part of it, is founded in reason and the nature of government; the name and the form are derived to us from our Gothic ancestors. Under the fœdal system, every owner of lands held them in subjection to some superior or lord, from whom or from whose ancestors the tenant or vassal had received them; and there was a mutual trust or confidence subsisting between the lord and vassal, that the lord should protect the vassal in the enjoyment of the territory he had granted him; and, on the other hand, that the vassal should be faithful to the lord, and defend him against all his enemies. This obligation on the part of the vassal was called his *fidelitas* or fealty: and an oath of fealty was required by the fœdal law to be taken by all tenants to their landlord, which is couched in almost the same terms as our ancient oath of allegiance; except that, in the usual oath of fealty, there was frequently a saving or exception of the faith due to a superior lord by name, under whom the landlord himself was perhaps only a tenant or vassal. But when the acknowledgment was made to the absolute superior himself, who was vassal to no man, it was no longer called the oath of fealty, but the oath of allegiance; and therein the tenant swore to bear faith to his sovereign lord, in opposition to all men, without any saving or exception. Land held by this exalted species of fealty, was called *feudum ligium*, a liege fee; the vassals *homines ligii*, or liege men; and the sovereign, their *dominus ligius*, or liege lord. And when sovereign princes did homage to each other for lands held under their respective sovereignties, a distinction was always made between *simple* homage, which was only an acknowledgment of tenure; and *liege* homage, which included the fealty before-mentioned, and the services consequent upon it. In Britain, it becoming a settled principle of tenure, that all lands in the kingdom are holden of the king as their sovereign and lord paramount, no oath but that of fealty could ever be taken to inferior lords; and the oath of allegiance was necessarily confined to the person of the king alone. By an easy analogy, the term of *allegiance* was soon brought to signify all other engagements which are due from subjects to their prince, as well as those duties which were simply and merely territorial. And the oath of allegiance, as administered in England for upwards of 600 years, contained a promise "to be true and faithful to the king and his heirs, and truth and faith to bear of life and limb and terrene honour, and not to know

Alley
||
Allegiance.

Allegiance. "know or hear of any ill or damage intended him, without defending him therefrom." But, at the revolution, the terms of this oath being thought perhaps to favour too much the notion of non-resistance, the present form was introduced by the convention parliament, which is more general and determinate than the former; the subject only promising "that he will be faithful and bear true allegiance to the king," without mentioning "his heirs," or specifying in the least wherein that allegiance consists. The oath of supremacy is principally calculated as a renunciation of the pope's pretended authority: and the oath of abjuration, introduced in the reign of King William, very amply supplies the loose and general texture of the oath of allegiance; it recognizing the right of his majesty, derived under the act of settlement; engaging to support him to the utmost of the juror's power; promising to disclose all traitorous conspiracies against him; and expressly renouncing any claim of the descendants of the late pretender, in as clear and explicit terms as the English language can furnish. This oath must be taken by all persons in any office, trust, or employment; and may be tendered by two justices of the peace to any person whom they shall suspect of disaffection. And the oath of allegiance may be tendered to all persons above the age of twelve years, whether natives, denizens, or aliens.

Blackstone's
Comment.

But, besides these *express* engagements, the law also holds that there is an *implied, original, and virtual* allegiance, owing from every subject to his sovereign, antecedently to any express promise, and although the subject never swore any faith or allegiance in form. Thus Sir Edward Coke very justly observes, that "all subjects are equally bounden to their allegiance as if they had taken the oath; because it is written by the finger of the law in their hearts, and the taking of the corporal oath is but an outward declaration of the same."

Allegiance, both express and implied, is however distinguished by the law into two sorts or species, the one *natural*, the other *local*; the former being also perpetual, the latter temporary.

Natural allegiance is such as is due from all men born within the king's dominions immediately upon their birth. For, immediately upon their birth, they are under the king's protection; at a time too, when (during their infancy) they are incapable of protecting themselves. Natural allegiance is, therefore, a debt of gratitude; which cannot be forfeited, cancelled, or altered, by any change of time, place, or circumstance, nor by any thing but the united concurrence of the legislature. A Briton who removes to France, or to China, owes the same allegiance to the king of Britain there as at home, and twenty years hence as well as now. For it is a principle of universal law, That the natural-born subject of one prince cannot by any act of his own, no, not by swearing allegiance to another, put off or discharge his natural allegiance to the former: for this natural allegiance was intrinsic, and primitive, and antecedent to the other; and cannot be divested without the concurrent act of that prince to whom it was first due.

Local allegiance is such as is due from an alien, or stranger born, for so long time as he continues within the king's dominion and protection; and it ceases the

instant such stranger transfers himself from this kingdom to another. Natural allegiance is therefore *perpetual*, and local *temporary* only; and that for this reason, evidently founded upon the nature of government, That allegiance is a debt due from the subject, upon an implied contract with the prince; that so long as the one affords protection, so long the other will demean himself faithfully.

Allegory.

The *oath* of allegiance, or rather the *allegiance* itself, is held to be applicable, not only to the political capacity of the king, or regal office, but to his natural person and blood-royal: and for the misapplication of their allegiance, viz. to the regal capacity or crown, exclusive of the person of the king, were the Spencers banished in the reign of Edward II. And from hence arose that principle of personal attachment and affectionate loyalty, which induced our forefathers (and, if occasion required, would doubtless induce their sons) to hazard all that was dear to them, life, fortune, and family, in defence and support of their liege lord and sovereign.

It is to be observed, however, in explanation of this allegiance, That it does not preclude resistance to the king, when his misconduct or weakness is such as to make resistance beneficial to the community. It seems fairly presumable, that the convention parliament, which introduced the oath of allegiance in its present form, did not intend to exclude all resistance; since the very authority by which the members sat together, was itself the effect of a successful opposition to an acknowledged sovereign.

Again: The allegiance above described can only be understood to signify obedience to lawful commands. If, therefore, the king should issue a proclamation, levying money or imposing any service or restraint upon the subject, beyond what the law authorized, there would exist no sort of obligation to obey such a proclamation, in consequence of having taken the oath of allegiance.

Neither can allegiance be supposed to extend to the king after he is actually and absolutely deposed, driven into exile, or otherwise rendered incapable of exercising the regal office. The promise of allegiance implies, that the person to whom the promise is made continues king; that is, continues to exercise the power, and afford the protection, which belong to the office of king: for it is the possession of these which makes such a particular person the object of the oath.

ALLEGORY, in composition, consists in choosing a secondary subject, having all its properties and circumstances resembling those of the principal subject, and describing the former in such a manner as to represent the latter. The principal subject is thus kept out of view, and we are left to discover it by reflection. In other words, an allegory is, in every respect, similar to an hieroglyphical painting, excepting only that words are used instead of colours. Their effects are precisely the same: An hieroglyphic raises two images in the mind; one seen, that represents one that is not seen: An allegory does the same; the representative subject is described, and the resemblance leads us to apply the description to the subject represented.

There cannot be a finer or more correct allegory than the following, in which a vineyard is made to represent God's own people the Jews:

3. N. 2

"Thou

Allegri.

"Thou hast brought a vine out of Egypt; thou hast cut out the heathen, and planted it. Thou didst cause it to take deep root, and it filled the land. The hills were covered with its shadow, and the boughs thereof were like the goodly cedars. Why hast thou then broken down her hedges, so that all that pass do pluck her? The boar out of the wood doth waste it, and the wild beast doth devour it. Return, we beseech thee, O God of hosts: look down from heaven, and behold, and visit this vine and the vineyard thy right-hand hath planted, and the branch thou madest strong for thyself." Psal. lxxx.

Nothing gives greater pleasure than an allegory, when the representative subject bears a strong analogy, in all its circumstances, to that which is represented. But most writers are unlucky in their choice, the analogy being generally so faint and obscure, as rather to puzzle than to please. Allegories, as well as metaphors and similes, are unnatural in expressing any severe passion which totally occupies the mind. For this reason, the following speech of Macbeth is justly condemned by the learned author of the Elements of Criticism:

Methought I heard a voice cry, Sleep no more!
Macbeth doth murder Sleep; the innocent sleep;
Sleep that knits up the ravell'd sleeve of Care,
The birth of each day's life, fore Labour's bath,
Balm of hurt minds, great Nature's second course,
Chief nourisher in life's feast. Act. ii. Sc. 3.

But see this subject more fully treated under the article METAPHOR and Allegory.

ALLEGRI (Antonio), called *Corregio* from the place of his birth, an eminent historical painter, was born in the year 1494. Being descended of poor parents, and educated in an obscure village, he enjoyed none of those advantages which contributed to form the other great painters of that illustrious age. He saw none of the statues of ancient Greece or Rome; nor any of the works of the established schools of Rome and Venice. But Nature was his guide; and Corregio was one of her favourite pupils. To express the facility with which he painted, he used to say that he always had his thoughts ready at the end of his pencil.

The agreeable smile, and the profusion of graces which he gave to his madonas, saints, and children, have been taxed with being sometimes unnatural; but still they are amiable and seducing: An easy and flowing pencil, an union and harmony of colours, and a perfect intelligence of light and shade, give an astonishing relief to all his pictures, and have been the admiration both of his contemporaries and his successors. Annibal Caracci, who flourished 50 years after him, studied and adopted his manner in preference to that of any other master. In a letter to his cousin Louis, he expresses with great warmth the impression which was made on him by the first sight of Corregio's paintings: "Every thing which I see here (says he) astonishes me; particularly the colouring and the beauty of the children. They live—they breathe—they smile with so much grace and so much reality, that it is impossible to refrain from smiling and partaking of their enjoyment. My heart is ready to break with grief when I think on the unhappy fate of poor Corregio—that so wonderful a man (if he ought not rather to be called an

angel) should finish his days so miserably, in a country where his talents were never known."

Allegri.

From want of curiosity or of resolution, or from want of patronage, Corregio never visited Rome, but remained his whole life at Parma, where the art of painting was little esteemed, and of consequence poorly rewarded. This concurrence of unfavourable circumstances occasioned at last his premature death at the age of 40. He was employed to paint the cupola of the cathedral at Parma, the subject of which is an assumption of the Virgin; and having executed it in a manner that has long been the admiration of every person of good taste, for the grandeur of design, and especially for the boldness of the fore-shortenings (an art which he first and at once brought to the utmost perfection), he went to receive his payment. The canons of the church, either through ignorance or baseness, found fault with his work; and although the price originally agreed upon had been very moderate, they alledged that it was far above the merit of the artist, and forced him to accept of the poultry sum of 200 livres; which, to add to the indignity, they paid him in copper money. To carry home this unworthy load to his indigent wife and children, poor Corregio had to travel six or eight miles from Parma. The weight of his burden, the heat of the weather, and his chagrin at this villanous treatment, immediately threw him into a pleurisy, which in three days put an end to his life and his misfortunes.

For the preservation of this magnificent work the world is indebted to Titian. As he passed through Parma, in the suite of Charles V. he ran instantly to see the *chef d'œuvre* of Corregio. While he was attentively viewing it, one of the principal canons of the church told him that such a grotesque performance did not merit his notice, and that they intended soon to have the whole defaced. "Have a care of what you do (replied the other), if I were not Titian, I would certainly wish to be Corregio."

Corregio's exclamation upon viewing a picture by Raphael is well known. Having long been accustomed to hear the most unbounded applause bestowed on the works of that divine painter, he by degrees became less desirous than afraid of seeing any of them. One, however, he at last had occasion to see. He examined it attentively for some minutes in profound silence; and then with an air of satisfaction exclaimed, *I am still a painter*. Julio Romano, on seeing some of Corregio's pictures at Parma, declared they were superior to any thing in painting he had yet beheld. One of these no doubt would be the famous Virgin and Child, with Mary Magdalene and St. Jerome: But whether our readers are to depend upon his opinion, or upon that of Lady Millar, who in her *Letters from Italy* gives a very unfavourable account of it, we shall not presume to determine. This lady, however, speaks in a very different style of the no less famous *Notte* or Night of Corregio, of which she saw only a copy in the Duke's palace at Modena, the original having been sold for a great sum of money to the king of Poland. "It surprises me very much (says she) to see how different the characters are in this picture from that which I already have described to you. The subject is a Nativity; and the extraordinary beauty of this picture proceeds from the *clair*
obscur:"

Allegro
||
Alleluiah.

obscure: there are two different lights introduced, by means of which the personages are visible; namely, the light proceeding from the body of the child, and the moon-light. These two are preserved distinct, and produce a most wonderful effect. The child's body is so luminous, that the superficies is nearly transparent, and the rays of light emitted by it are verified in the effect they produce upon the surrounding objects. They are not rays distinct and separate, like those round the face of a sun that indicates an insurance-office; nor linear, like those proceeding from the man in the almanack; but of a dazzling brightness: by their light you see clearly the face, neck, and hands, of the Virgin (the rest of the person being in strong shadow), the face of the *pastori* who crowd round the child, and particularly one woman, who holds her hand before her face, lest her eyes should be so dazzled as to prevent her from beholding the Infant. This is a beautiful natural action, and is most ingeniously introduced. The straw on which the child is laid appears gilt, from the light of his body shining on it. The moon lights up the back-ground of the picture, which represents a landscape. Every object is distinct, as in a bright moon-light night; and there cannot be two lights in nature more different than those which appear in the same picture. The virgin and the child are of the most perfect beauty. There is a great variety of character in the different persons present, yet that uniformity common to all herdsmen and peasants. In short, this copy is so admirable, that I was quite sorry to be obliged to lose sight of it so soon; but I never shall forget it. The duke of Modena, for whom Corregio did the original picture, gave him only 600 livres of France for it; a great sum in those days: but at present, what ought it to cost? This great painter's death happened in 1534.

ALLEGRO, in music, an Italian word, denoting that the part is to be played in a sprightly, brisk, lively, and gay manner.

Piu ALLEGRO, signifies, that the part it is joined to should be sung or played quicker; as

Poco piu ALLEGRO intimates, that the part to which it refers ought to be played or sung only a little more briskly than allegro alone requires.

ALLEIN (Joseph), the son of Tobias Allein, was born in the Devizes, in Wiltshire, in 1633, and educated at Oxford. In 1655, he became assistant to Mr Newton, in Taunton-Magdalen, in Somersetshire; but was deprived for non-conformity. He died in 1668, aged 35. He was a man of great learning, and greater charity; preserving, though a nonconformist and a severe sufferer on that account, great respect for the church, and loyalty to his sovereign. He wrote several books of piety, which are highly esteemed; but his *Alarm to unconverted sinners* is more famous than the rest. There have been many editions of this little pious work, the sale of which has been very great; of the edition 1672, there were 20,000 sold; of that of 1675, with this title, *A sure guide to heaven*, 50,000. There was also a large impression of it with its first title, in 1720.

ALLELUIAH, or HALLELUIAH, a word signifying, *praise the Lord*, to be met with either at the beginning or end of some psalms: such is psalm cxlv. and those that follow, to the end. Alleluiah was sung upon solemn days of rejoicings, Tobit xiii. 12. St John

in the Revelations (xix. 1, 3, 4, 6.) says, that he heard a great voice of much people in heaven, who said, Alleluiah; and the four and twenty elders, and the four beasts, fell down and worshipped God that sat on the throne, saying, *Alleluiah*." This hymn of joy and praises was transferred from the synagogue to the church. St Jerom tells us, that at the funeral of Fabiola several psalms were sung with loud alleluias; and that the monks of Palestine were awakened, at their midnight watchings, with the singing of Alleluias. So much energy has been observed in this term, that the ancient church thought proper to preserve it, without translating it either into Greek or Latin, for fear of impairing the genius and softness of it. The fourth council of Toledo has prohibited the use of it in times of Lent, or other days of fasting, and in the ceremonies of mourning; and, according to the present practice of the Romish church, this word is never repeated in Lent, nor in the obsequies of the dead; notwithstanding which, it is used in the mass for the dead, according to the mosarabic ritual, at the introit, when they sing, *Tu es portio mea, Domine, Alleluia, in terra viventium, Alleluia, Alleluiah*. The singing alleluiah was oftentimes an invitatory or call to each other to praise the Lord.

ALLEMAND, a sort of grave solemn music, with good measure, and a slow movement.—It is also a brisk kind of dance, very common in Germany and Switzerland.

ALLEMANNIC, in a general sense, denotes any thing belonging to the ancient Germans. Thus, we meet with Allemannic history, Allemannic language, Allemannic law, &c.

ALLEN (John) archbishop of Dublin in the reign of king Henry VIII. was educated in the university of Oxford; from whence removing to Cambridge, he there took the degree of bachelor of laws. He was sent by Dr Warham, archbishop of Canterbury, to the pope, about certain matters relating to the church. He continued at Rome nine years, and was created doctor of laws; either there or in some other university of Italy. After his return, he was appointed chaplain to Cardinal Wolsey, and was commissary or judge of his court as legate *à latere*; in the execution of which office he was suspected of great dishonesty, and even perjury. He assisted the cardinal in visiting, and afterwards suppressing, 40 of the smaller monasteries, for the erection of his college at Oxford and that at Ipswich. The cardinal procured for him the living of Dalby in Leicestershire, though it belonged to the master and brethren of the hospital at Burton Lazars. About the latter end of the year 1525 he was incorporated doctor of laws in the university of Oxford. On the 13th of March 1528 he was consecrated archbishop of Dublin, in the room of Dr Hugh Inge deceased; and about the same time was made chancellor of Ireland. He wrote, 1. *Epistola de Pallii significatione activa et passiva*: penned by him at the time when he received the archiepiscopal pall. 2. *De consuetudinibus ac statutis in tuitoriis causis observandis*. He wrote also several other pieces relating to the church. His death, which happened in July 1534, was very tragical: for being taken in a time of rebellion by Thomas Fitzgerald, eldest son to the earl of Kildare, he was by his command most cruelly murdered, being

Allemand
||
Allen.

Allen
||
Allerion.

brained like an ox, at Tartaine in Ireland, in the 58th year of his age. The place where the murder was committed was afterwards hedged in, overgrown, and unfrequented, in detestation of the fact.

ALLEN (Thomas), a famous mathematician of the 16th century, born at Utoxeter in Staffordshire the 21st of December 1542. He was admitted scholar of Trinity college Oxford the 4th of June 1561; and in 1567 took his degree of master of arts. In 1570 he quitted his college and fellowship and retired to Gloucester-hall; where he studied very closely, and became famous for his knowledge in antiquity, philosophy, and mathematics. Having received an invitation from Henry earl of Northumberland, a great friend and patron of the mathematicians, he spent some time at the earl's house, where he became acquainted with those celebrated mathematicians, Thomas Harriot, John Dee, Walter Warner, and Nathaniel Torporley. Robert earl of Leicester had a particular esteem for Mr Allen, and would have conferred a bishopric upon him, but his love of solitude and retirement made him decline the offer. His great skill in the mathematics made the ignorant and vulgar look upon him as a magician or conjurer: the author of a book intitled *Leicester's Commonwealth*, has accordingly accused him with using the art of figuring, to procure the earl of Leicester's unlawful designs, and endeavouring by the black art to bring about a match betwixt him and Queen Elizabeth. But without pretending to point out the absurdity of the charge, it is certain that the earl placed such confidence in Allen, that nothing material in the state was transacted without his knowledge; and the earl had constant information, by letter, from Mr Allen, of what passed in the university. Mr Allen was very curious and indefatigable in collecting scattered manuscripts relating to history, antiquity, astronomy, philosophy, and mathematics: these collections have been quoted by several learned authors, &c. and mentioned to have been in the Bibliotheca Alleniana. He published in Latin the second and third books of Claudius Ptolemy of Pelusium, *Concerning the judgment of the Stars*, or, as it is commonly called, of the *Quadrupartite Construction*, with an exposition. He wrote also notes on many of Lilly's books, and some on John Bale's work *De Scriptoribus M. Britannie*. Having lived to a great age, he died at Gloucester-hall on the 30th of September 1632.

ALLENDORF, a small town in the circle of the Upper Rhine, and in the landgravate of Hesse-Cassel, remarkable for its salt-works and three strong bridges. It is seated on the river Weser, 15 miles east of Cassel; E. Long. 10. 5. N. Lat. 51. 26.

ALLER, a river which runs through the duchy of Lunenburg, and falls into the Weser a little below Verden.

ALLER, *good*, in our ancient writers. The word *aller* serves to make the expression of superlative signification. So, *aller-good* is the greatest good. Sometimes it is written *alder*.

ALLERION, or ALERION, in heraldry, a sort of eagle without beak or feet, having nothing perfect but the wings. They differ from martlets by having their wings expanded, whereas those of the martlet are close; and denote imperialists vanquished and disarmed; for which reason they are more common in French than in German coats of arms.

ALLESTRY (Richard, D.D.) an eminent divine, born at Uppington in Shropshire in March 1619, was educated in the grammar-school at Coventry, and afterwards at Christ church in Oxford. His parts, which were extraordinary, were improved by a no less extraordinary industry. He took up arms for king Charles I. and was sometimes seen with his musket in one hand and his book in the other. He was very active in the service of king Charles II. before his restoration, and was employed by the royalists in transacting business with that prince during his exile; but was at last seized at Dover by a party of soldiers, and committed prisoner to Lambeth-house, where he was confined six or eight weeks: but soon after the restoration he was made canon of Christ church, created doctor of divinity, and appointed chaplain in ordinary to the king, and regius professor of divinity. In 1665, he was appointed provost of Eton college, where he raised the school, which he found in a low condition, to an uncommon pitch of reputation. The west side of the outward quadrangle of that college was built from the ground at his expence. The excellent Dr Hammond, who was his intimate friend, left him his valuable library, which he himself afterwards bequeathed to his successors in the divinity-chair. He was eminent for his piety, benevolence, and integrity; for the sincerity of his friendship, and his disinterested temper. He wrote several books; and a collection of his sermons were printed after his decease by Dr Fell bishop of Oxford. He died August 28. 1680.

ALLESTRY (Jacob), an English poet of the last century. He was the son of James Allestry, a bookseller of London who was ruined by the great fire in 1666. Jacob was educated at Westminster-school, entered at Christ church Oxford in the act-term 1671 at the age of 18, and was elected student in 1672. He took the degree in arts; was music-reader in 1679; and *terre filius* in 1681; both which offices he executed with great applause, being esteemed a good philologist and poet. He had a chief hand in the verses and pastorals spoken in the theatre at Oxford May 21. 1681, by Mr William Savile second son of the marquis of Halifax, and George Cholmondeley second son of Robert Viscount Kells (both of Christ church), before James duke of York, his duchess, and the lady Anne; which verses and pastorals were afterwards printed in the "*Examen Poeticum*." He died October 15. 1686, and was buried in St Thomas's church-yard.

ALLEVEURE, a small brass Swedish coin, worth about $\frac{1}{4}$ d. English money.

ALLEVIATION, denotes the making a thing lighter, and easier to bear or endure. It stands opposed to *aggravation*.

ALLEY (William), bishop of Exeter in the reign of queen Elizabeth, was born at Great Weycomb in Buckinghamshire. From Eton school, in the year 1528, he removed to king's college Cambridge, where he took the degree of bachelor of Arts. He also studied some time at Oxford; afterwards he married, was presented to a living, and became a zealous reformer. Upon queen Mary's accession he left his cure and retired into the north of England; where he maintained his wife and himself by teaching a school, and practising physic. Queen Elizabeth ascending the throne, he went to London, where he acquired great reputation by reading the divinity-lecture at St Paul's, and

Allestry
||
Alley.

Alley. in July 1560 was consecrated bishop of Exeter. He was created doctor of divinity at Oxford in November 1561. He died on the 15th of April 1570, and was buried at Exeter in the cathedral. He wrote, 1. *The poor man's library*, 2 vol. fol. Lond. 1571. These volumes contain twelve lectures on the first epistle of St Peter, read at St. Paul's. 2. *A Hebrew grammar*. Whether it was ever published is uncertain. He translated the Pentateuch, in the version of the Bible which was undertaken by queen Elizabeth's command.

ALLEY, in gardening, a straight parallel walk, bounded on both sides with trees, shrubs, &c. and usually covered with gravel or turf.

ALLEY, among builders, denotes a narrow passage leading from one place to another.

ALLEY, in perspective, that which, in order to have a greater appearance of length, is made wider at the entrance than at the termination.

ALLEY, in the new husbandry, implies the vacant space between the outermost row of corn on one bed and the nearest row to it on the next parallel bed; and it is usually about four feet in breadth, exclusive of the partitions between the rows of corn in the beds. The first hoeing of wheat is performed in the beginning of winter, and the earth is ploughed away from the rows into the intervals, which forms small ridges in the middle between the double rows. The second hoeing is in the spring, which turns it back to the rows, leaving a furrow in the middle of the alley. The third hoeing is from the rows, after the wheat has blossomed; this turns the earth into the intervals, forming small ridges there, as at the first hoeing. The fourth hoeing returns the earth to the ridges, which is performed a month or more after the third hoeing. This commonly finishes the horse-hoeings, if the land is in good heart; otherwise one or two more hoeings are necessary.

ALLEYN (Edward), a celebrated English actor in the reigns of queen Elizabeth and king James, and founder of the college at Dulwich in Surry, was born at London, in the parish of St Botolph, Sept. 1. 1566, as appears from a memorandum of his own writing. Dr Fuller says, that he was bred a stage-player; and that his father would have given him a liberal education, but that he was not turned for a serious course of life. He was, however, a youth of an excellent capacity, a cheerful temper, a tenacious memory, a sweet elocution, and in his person of a stately port and aspect; all which advantages might well induce a young man to take to the theatrical profession. By several authorities we find he must have been on the stage some time before 1592; for at this time he was in high favour with the town, and greatly applauded by the best judges, particularly by Ben Johnson.

Haywood, in his prologue to Marloe's Jew of Malta, calls him Proteus for shapes, and Roscius for a tongue. He usually played the capital parts, and was one of the original actors in Shakespeare's plays; in some of Ben Johnson's he was also a principal performer: but what characters he personated in either of these poets, it is difficult now to determine. This is owing to the inaccuracy of their editors, who did not print the names of the players opposite to the characters they performed, as the modern custom is; but gave one general list of actors to the whole set of plays, as

in the old folio edition of Shakespeare; or divided one from the other, setting the dramatis personæ before the plays, and the catalogue of performers after them, as in Johnson's.

It may appear surprising how one of Mr Alleyn's profession should be enabled to erect such an edifice as Dulwich College, and liberally endow it for the maintenance of so many persons. But it must be observed that he had some paternal fortune, which, though small, might lay a foundation for his future affluence; and it is to be presumed, that the profits he received from acting, to one of his provident and managing disposition, and one who by his excellence in playing drew after him such crowds of spectators, must have considerably improved his fortune: besides, he was not only an actor, but master of a playhouse, built at his own expence, by which he is said to have amassed considerable wealth. He was also keeper of the king's wild beasts, or master of the royal bear-garden, which was frequented by vast crowds of spectators; and the profits arising from these sports are said to have amounted to 500l. per annum. He was thrice married; and the portions of his two first wives, they leaving him no issue to inherit, might probably contribute to this benefaction. Such kind of donations have been frequently thought to proceed more from vanity and ostentation than real piety; but this of Mr Alleyn has been ascribed to a very singular cause, for the devil has been said to be the first promoter of it. Mr Aubrey mentions a tradition, "that Mr Alleyn playing a demon with six others, in one of Shakespeare's plays, was, in the midst of the play, surprised by an apparition of the devil; which so worked on his fancy, that he made a vow, which he performed by building Dulwich College." He began the foundation of this college, under the direction of Inigo Jones, in 1614; and the buildings, gardens, &c. were finished in 1617, in which he is said to have expended about 10,000l. After the college was built, he met with some difficulty in obtaining a charter for settling his lands in mortmain: for he proposed to endow it with 8000l. per annum, for the maintenance of one master, one warden, and four fellows, three whereof were to be clergymen, and the fourth a skilful organist; also six poor men and as many women, besides twelve poor boys to be educated till the age of fourteen or sixteen, and then put out to some trade or calling. The obstruction he met with arose from the lord chancellor Bacon, who wished king James to settle part of those lands for the support of two academical lectures; and he wrote a letter to the Marquis of Buckingham, dated August 18. 1618; intreating him to use his interest with his Majesty for that purpose. Mr Alleyn's solicitation was however at last complied with, and he obtained the royal licence, giving him full power to lay his foundation, by his Majesty's letter-patent, bearing date the 21st of June 1619; by virtue whereof he did, in the chapel of the said new hospital at Dulwich, called, "The College of God's Gift," on the 13th of September following, publicly read and published a quadripartite writing in parchment, whereby he created and established the said college; he then subscribed it with his name, and fixed his seal to several parts thereof, in presence of several honourable persons, and ordered copies of the writings to four different

Alleyn.

Alleyne different parishes. He was himself the first master of his college; so that to make use of the words of Mr Haywood, one of his contemporaries, "He was so mingled with humility and charity, that he became his own pensioner, humbly submitting himself to that proportion of diet and clothes which he had bestowed on others." We have no reason to think he ever repented of this distribution of his substance; but on the contrary, that he was entirely satisfied, as appears from the following memorial in his own writing, found amongst his papers: "May 26, 1620—My wife and I acknowledged the fine at the common pleas bar, of all our lands to the college: blessed be God that he has given us life to do it." His wife died in the year 1623; and about two years afterwards he married Constance Kinchtoe, who survived him, and received remarkable proofs of his affection, if at least we may judge of it by his will, wherein he left her considerably. He died Nov. 25. 1626, in the 61st year of his age, and was buried in the chapel of his new college, where there is a tomb-stone over his grave, with an inscription. His original Diary is also there preserved.

The subjoined anecdote is entertaining in itself, and shows the high esteem in which Mr Alleyne was held as an actor: "Edward Alleyne, the Garrick of Shakespeare's time, had been on the most friendly footing with our poet, as well as Ben Johnson. They used frequently to spend their evenings together at the sign of the Globe, somewhere near Black Friars, where the playhouse then was. The world need not be told, that the convivial hours of such a triumvirate must be pleasing as well as profitable, and may truly be said to be such pleasures as might bear the reflections of the morning. In consequence of one of these meetings, the following letter was written by G. Peel, a Fellow of Christ-church college, Oxford, and a dramatic poet, who belonged to the Club, to one Marle, an intimate of his:

"Friend Marle,

"I must desyr that my syster hyr watch, and the cookerie book you promysed, may be sente bye the man.—I never longed for thy company more than last night; we were all very merrye at the Globe, when Ned Alleyne did not scruple to affyrme pleasantly to thy Friende Will, that he had stolen his speech about the Qualities of an actor's excellencye in Hamlet hys Tragedye, from conversations many-fold whych had passed betweene them, and opinyons given by Alleyne touchinge the subjecte.—Shakespeare did not take this talke in good sorte; but Johnson put an end to the strife with wittyllye remarkinge, *This affaire needeth no Contentione; you stole it from Ned, no doubt; do not marvel: Have you not seen him att tymes out of number?*—Believe me most syncerilie, yours, G. Peele."

ALLIA, a river of Italy, which running down a very steep channel from the mountains of Crustumium, mixes with the Tiber at 40 miles from Rome; famous for the great slaughter of the Romans by the Gauls, under Brennus; hence *Alliensis dies*, an unlucky day, (Virgil, Ovid, Lucan.) Our ancestors, says Cicero, deemed the day of the fight of *Allia* more fatal than that of taking the city.

ALLIANCE, in the civil and canon law, the relation contracted between two persons or two families by marriage.

ALLIANCE is also used for a treaty entered into by sovereign princes and states, for their mutual safety and defence.—In this sense, alliances may be distinguished into such as are offensive, whereby the contracting parties oblige themselves jointly to attack some other power; and into defensive ones, whereby they bind themselves to stand by and defend each other in case they are attacked by others.—Alliance, with the ancient Romans, though a sort of servitude, was much coveted. Ariarathes, we are told by Polybius, offered a sacrifice to the gods by way of thanksgiving for having obtained this alliance. The reason was, that thenceforwards people were sure not to receive any injuries except from them.—There were different sorts of allies: some only united to them by a participation of the privileges of Romans, as the Latini and Hernici; others by their very foundation, as the colonies; others by the benefactions they received from them, as Maffinissa, Eumenes, and Attalus, who owed their kingdoms to Rome; others by free treaties, which last by a long alliance became subjects, as the kings of Bythynia, Capadocia, Egypt, and most of the cities of Greece: lastly, others by compulsive treaties, and the law of subjection, as Philip and Antiochus. For they never granted peace to an enemy, without making an alliance with him; that is, they never subdued any people without using it as a means of subduing others.

The forms or ceremonies of alliances have been various in different ages and countries. Among us, signing and swearing, sometimes at the altar, are the chief; anciently eating and drinking together, chiefly offering sacrifices together, were the customary rite of ratifying an alliance. Among the Jews and Chaldeans, heifers or calves; among the Greeks, bulls or goats; and among the Romans, hogs were sacrificed on this occasion. Among the ancient Arabs, alliances were confirmed by drawing blood out of the palms of the hands of the two contracting princes with a sharp stone, dipping herein a piece of their garments, and therewith smearing seven stones, at the same time invoking the gods Vrotalt and Alilat, *i. e.* according to Herodotus, Bacchus and Urania. Among the people of Chelchis, the confirmation of alliances is said to be effected by one of the princes offering his wife's breasts to the other to suck, which he was obliged to do till there issued blood.

ALLIANCE, in a figurative sense, is applied to any kind of union or connection; thus we say, there is an alliance between the church and state.

ALLIGATI, in Roman antiquity, the basest kind of slaves, who were usually kept fettered. The Romans had three degrees, or orders, of slaves or servants; the first employed in the management of their estates; the second in the menial or lower functions of the family; the third called *alligati*, above mentioned.

ALLIGATION, the name of a method of solving all questions that relate to the mixture of one ingredient with another. Though writers on arithmetic generally make alligation a branch of that science; yet, as it is plainly nothing more than an application of the common properties of numbers, in order to solve a few questions that occur in particular branches of business, we

Alligation, we choose rather to keep it distinct from the science of arithmetic.

Alligation is generally divided into *medial* or *alternate*.

ALLIGATION Medial, from the rates and quantities of the simples given, discovers the rate of the mixture.

Rule. As the total quantity of the simples,
To their price or value;
So any quantity of the mixture,
To the rate.

Examp. A grocer mixeth 30 lb. of currants, at 4d. per lb. with 10 lb. of other currants, at 6d. per lb.: What is the value of 1 lb. of the mixture? *Ans.* 4½d.

lb.	d.	d.
30, at 4 amounts to	120	
10, at 6 ———	60	
40	180	

If 40 : 180 :: 1 : 4½

Note 1. When the quantity of each simple is the same, the rate of the mixture is readily found by adding the rates of the simples, and dividing their sum by the number of simples. Thus,

Suppose a grocer mixes several sorts of sugar, and of each an equal quantity, viz. at 50s. at 54s. and at 60s. per cwt. the rate of the mixture will be 54s. 8d. per cwt.; for

s. s. d.

50 + 54 + 60 = 164, and 3)164)54 8

Note 2. If it be required to increase or diminish the quantity of the mixture, say, As the sum of the given quantities of the simples, to the several quantities given; so the quantity of the mixture proposed, to the quantities of the simples sought.

Note 3. If it be required to know how much of each simple is an assigned portion of the mixture, say, As the quantity of the mixture, to the several quantities of the simples given; so the quantity of the assigned portion, to the quantities of the simples sought. Thus,

Suppose a grocer mixes 10 lb. of raisins with 30 lb. of almonds and 40 lb. of currants, and it be demanded, how many ounces of each sort are found in every pound or in every 16 ounces of the mixture, say,

Oz.
80 : 10 :: 16 : 2 raisins.
80 : 30 :: 16 : 6 almonds.
80 : 40 :: 16 : 8 currants.

Proof 16

Note 4. If the rates of two simples, with the total value and total quantity of the mixture, be given, the quantity of each simple may be found as follows, viz. Multiply the lesser rate into the total quantity, subtract the product from the total value, and the remainder will be equal to the product of the excess of the higher rate above the lower, multiplied into the quantity of the higher-priced simple; and consequently the said remainder, divided by the difference of the rates, will quote the said quantity. Thus,

Suppose a grocer has a mixture of 400 lb. weight, that cost him 7 l. 10s. consisting of raisins at 4d. per lb.

VOL. I. Part II.

and almonds at 6d. how many pounds of almonds were in the mixture? *Alligation.*

L. s. d.	lb.	Rates.	L. s. d.
7 10 = 1800	400	6d.	2 10
1600	4	4d.	5 0
	1600 d.	2 d.	
	2)200(100 lb. of almonds at 6d. is		
	And 300 lb. of raisins at 4d. is		
	Total 400	Proof 7 10	

ALLIGATION Alternate, being the converse of alligation medial, from the rates of the simples, and rate of the mixture given, finds the quantities of the simples.

Rules. I. Place the rate of the mixture on the left side of a brace, as the root; and on the right side of the brace set the rates of the several simples, under one another, as the branches. II. Link or alligate the branches, so as one greater and another less than the root may be linked or yoked together. III. Set the difference betwixt the root and the several branches right against their respective yoke-fellows. These alternate differences are the quantities required. *Note, 1.* If any branch happen to have two or more yoke-fellows, the difference betwixt the root and these yoke-fellows must be placed right against the said branch, one after another, and added into one sum. 2. In some questions, the branches may be alligated more ways than one; and a question will always admit of so many answers as there are different ways of linking the branches.

Alligation alternate admits of three varieties, viz.

1. The question may be unlimited, with respect both to the quantity of the simples and that of the mixture. 2. The question may be limited to a certain quantity of one or more of the simples. 3. The question may be limited to a certain quantity of the mixture.

Variety I. When the question is unlimited, with respect both to the quantity of the simples and that of the mixture, this is called *Alligation Simple*.

Examp. A grocer would mix sugars, at 5d. 7d. and 10d. per lb. so as to sell the mixture or compound at 8d. per lb.: What quantity of each must he take?

lb.		
8 { 5	2	2
7	2	2
10	3, 1	4

Here the rate of the mixture 8 is placed on the left side of the brace, as the root; and on the right side of the same brace are set the rates of the several simples, viz. 5, 7, 10, under one another, as the branches; according to Rule I.

The branch 10 being greater than the root, is alligated or linked with 7 and 5, both these being less than the root; as directed in Rule II.

The difference between the root 8 and the branch 5, viz. 3, is set right against this branch's yoke-fellow 10. The difference between 8 and 7 is likewise set right against the yoke-fellow 10. And the difference betwixt 8 and 10, viz. 2, is set right against the two yoke-fellows 7 and 5; as prescribed by Rule III.

As the branch 10 has two differences on the right, viz.

3 0

viz.

Alligation. viz. 3 and 1, they are added; and the answer to the question is, that 2 lb. at 5d. 2 lb. at 7d. and 4 lb. at 10d. will make the mixture required.

The truth and reason of the rules will appear by considering, that whatever is lost upon any one branch is gained upon its yoke-fellow. Thus, in the above example, by selling 4 lb. of 10d. sugar at 8d. per lb. there is 8d. lost: but the like sum is gained upon its two yoke-fellows; for by selling 2 lb. of 5d. sugar at 8d. per lb. there is 6d. gained; and by selling 2 lb. of 7d. sugar at 8d. there is 2d. gained; and 6d. and 2d. make 8d.

Hence it follows, that the rate of the mixture must always be mean or middle with respect to the rates of the simples; that is, it must be less than the greatest, and greater than the least; otherwise a solution would be impossible. And the price of the total quantity mixed, computed at the rate of the mixture, will always be equal to the sum of the prices of the several quantities cast up at the respective rates of the simples.

Variety II. When the question is limited to a certain quantity of one or more of the simples, this is called *Alligation Partial*.

If the quantity of one of the simples only be limited, alligate the branches, and take their differences, as if there had been no such limitation; and then work by the following proportion:

As the difference right against the rate of the simple whose quantity is given,
To the other differences respectively;
So the quantity given,
To the several quantities sought.

Examp. A distiller would, with 40 gallons of brandy at 12s. per gallon, mix rum at 7s. per gallon, and gin at 4s. per gallon: How much of the rum and gin must he take, to sell the mixture at 8s. per gallon?

$$\begin{array}{r} \text{Gal.} \\ 8 \left\{ \begin{array}{l} 12 \\ 7 \\ 4 \end{array} \right\} \begin{array}{l} 4 \\ 4 \\ 4 \end{array} \left| \begin{array}{l} 5 \\ 4 \\ 4 \end{array} \right| \begin{array}{l} 40 \text{ of brandy.} \\ 32 \text{ of rum.} \\ 32 \text{ of gin.} \end{array} \right\} \text{Ans.} \end{array}$$

The operation gives for answer, 5 gallons of brandy, 4 of rum, and 4 of gin. But the question limits the quantity of brandy to 40 gallons; therefore say,

$$\text{If } 5 : 4 :: 40 : 32$$

The quantity of gin, by the operation, being also 4, the proportion needs not be repeated.

Variety III. When the question is limited to a certain quantity of the mixture, this is called *Alligation Total*.

After linking the branches, and taking the differences, work by the proportion following:

As the sum of the differences,
To each particular difference;
So the given total of the mixture,
To the respective quantities required.

Examp. A vintner hath wine at 3s. per gallon, and would mix it with water, so as to make a composition of 144 gallons, worth 2s. 6d. per gallon: How much wine, and how much water, must he take?

$$\begin{array}{r} \text{Gal.} \\ 30 \left\{ \begin{array}{l} 36 \\ 0 \end{array} \right\} \begin{array}{l} 30 \\ 6 \end{array} \left| \begin{array}{l} 120 \text{ of wine.} \\ 24 \text{ of water.} \end{array} \right\} \text{Ans.} \\ \hline 36 \mid 144 \text{ total.} \\ 120 \times 36 = 4320 \\ 24 \times 6 = 144 \end{array}$$

Proof 144)4320(30

$$\text{As } 36 : 30 :: 144 : 120$$

$$\text{As } 36 : 6 :: 144 : 24$$

There being here only two simples, and the total of the mixture limited, the question admits but of one answer.

ALLIGATOR, in zoology, a synonyme of the *lacerta crocodilus*. See **LACERTA**.

ALLIGATOR Pear. See **LAURUS**.

ALLIONIA, in botany, a genus of the monogynia order, belonging to the tetrandria class of plants; and in the natural method ranking under the 48th order, *Aggregatae*. The characters are: The common calyx is oblong, simple, three-flowered, five-parted, and persistent; the proper one, obscure, above: The proper corolla is monopetalous and funnel-shaped; the mouth quinquefid and erect: The stamina consist of four bristly filaments, longer than the corolla, and bending to one side; the antheræ are roundish: The pistillum has an oblong germen beneath; the stylus is bristly, and longer than the stamina; the stigmata are multifid and linear: There is no pericarpium: The seeds are solitary, oblong, and naked: The receptaculum is naked. There are two species, the *violeacea* and *incarnata*, both natives of America.

ALLIOTH, a star in the tail of the greater bear, much used for finding the latitude at sea.

ALLITERATION, an ornament of language chiefly used in poetry, and consisting in the repetition of the same letter at certain intervals. We do not remember to have ever seen any satisfactory account of alliteration in the writings of the critics. They seem to have passed it over in contemptuous silence; either as a false refinement or as a mere trifle. It perhaps deserves a better fate. Many chapters have been composed on quantity, on the expression resulting from different arrangements of long and short syllables, and on the powers of pauses as they are variously placed, without a word of alliteration. This is the more extraordinary, as one should think it impossible for any man to examine minutely, and, as it were, dissect a number of verses, without perceiving the vast abundance of this ornament. It is as if an anatomist should publish a complete table of the arteries in the human body, and affect never to have seen a vein nor a nerve: for it may be affirmed, with small danger of mistake, that if you examine any number of verses, remarkable either for sweetness or for energy, they will be found in some degree alliterative. We do not pretend to say, that the sweetness and energy of versification depends chiefly on this circumstance, yet we cannot help believing that it may claim some share: for it is a constant appearance, as far as we have ever observed, that the poets whose fame is highest for versification, are most extensive dealers in this article.

The trifling poor appearance of the ornament itself, upon

Alligator
||
Alliteration.

Alliteration.

upon a superficial view, and the frequent abuse of it, are circumstances indeed which give no encouragement to a serious inquiry into its nature and operation. How common is it for writers, who affect to be comic, when in want of other means for raising a smile, to use affected alliteration with success. But, in the fine arts, no beauty nor grace is beyond the power of ridicule. The noblest attitudes in painting have been rendered laughable by caricature. St Paul preaching at Athens, in the design of Raphael, appears elegant, noble, and in some degree awful. The same apostle, represented by Hogarth in nearly the same attitude, pleading before the governor Felix, seems altogether ridiculous. So the language and versification of Milton in the *Paradise Lost* appear only proper for the most elevated subjects. In the *Splendid Shilling* of Philips, they appear equally proper for the lowest. So fares it also with alliteration. Nor ought we to be mortified at the discovery, that much of the delight afforded by versification arises from a cause so pitiful as the repetition of the same letter twice, or oftener, on the accented parts of a verse; for there are many other causes of pleasure, which, when thus detected and taken to pieces, seem equally contemptible.

We apprehend the principal operation of this ornament to be quite mechanical. It is easier for the organs of speech to resume, at short intervals, one certain conformation, than to throw themselves into a number of different ones, unconnected and discordant. For example, a succession of labials, interspersed at regular distances with dentals and gutturals, will be more easily pronounced than the succession of all the three at random. Sounds of which the articulation is easiest, are most completely in the power of the speaker. He can pronounce them slowly or rapidly, softly or with force, at pleasure. In this we imagine the power and advantage of alliteration is founded: for we would not lay any stress on the pleasure which can result to the ear from the repetition of the same letter. It has been compared to the frequent returns of the key-note in a musical strain; but that analogy is extremely faint. The ear, we presume, can be pleased with alliteration only in so far as it contributes to the superior easiness of recitation; for what is recited with ease must be heard with pleasure.

These remarks might be confirmed and illustrated by numberless passages from the best poets. Some few lines will suffice, taken from Grey, who seems to have paid particular attention to this grace. He professed to have learned his versification from Dryden, as Dryden did from Spencer; and these three abound in alliteration above all the English poets. We choose Grey for another reason, in proof of what we mentioned before, that alliteration contributes not only to the *sweetness*, but also to the *energy*, of versification; for he uses it chiefly when he aims at strength and boldness. In the *Sister Odes* (as Dr Johnson styles them), almost every strophe commences and concludes with an alliterative line. The poet, we suppose, wished to begin with force, and end with dignity.

"Ruin seize thee, ruthless king."
 "To high-born Hoel's harp, or soft Llewellyn's lay."
 "Weave the warp, and weave the woof."
 "Stamp we our vengeance deep, and ratify his doom."

"Regardless of the sweeping whirlwind's sway."
 "That hush'd in grim repose, expects his evening prey."

Alliteration,
Allium.

It must be observed here, that we hold a verse alliterative which has a letter repeated on its accented parts, although those parts do not begin words; the repeated letter bearing a strong analogy to the bars in a musical phrase. Grey seems to have had a particular liking to these sort of balanced verses, which divide equally, and of which the opposite sides have an alliterative resemblance.

"Eyes that glow, and fangs that grin,
 "Thoughts that breathe, and words that burn."
 "Hauberk crash, and helmet ring."

All these lines appear to us to have a force and energy, arising from alliteration, which renders them easy to be recited; or, if the reader pleases, *mouthed*. For the same reason the following passage appears sad and solemn, by the repetition of the labial liquid.

"Mountains, ye mourn in vain."
 "Modred, whose magic song,"—&c.

If alliteration then contributes to enforce the expression of a poet's sentiment, its advantages in poetry must be considerable. It is not, therefore, unworthy a poet's regard in the act of composition. If two words offer of equal propriety, the one alliterative, the other not, we think the first ought to be chosen. We would compare this to the practice of fuguing in music. A composer who aims at expression will not hunt after fugues; but if they offer, if they seem to arise spontaneously from the subject, he will not reject them. So a good poet ought not to select an epithet merely for beginning with a certain letter, unless it suit his purpose well in every other respect; for the beauty of alliteration, when happy, is not greater than its deformity when affected. A couplet from Pope will exemplify both; the first line being bad, and the second good:

"Eternal beauties grace the shining scene,
 "Fields ever fresh, and groves for ever green."

ALLIUM (from *alio*, "to avoid or shun," because many shun the smell of it), GARLIC: A genus of the monogynia order, belonging to the hexandria class of plants; and in the natural method ranking in the 9th order, *Spathaceæ*. The characters are: The *calyx* is a common spatha, roundish, withering, and multiflorous: The *corolla* consists of six oblong petals: The *stamina* have six subulated filaments, often the length of the corolla; the antheræ are oblong and erect: The *pistillum* has a germen above, shorter, nearly three-cornered, with angles engraved with a line; the styli are simple, the stigmata acute: The *pericarpium* is a very short, broad, three-lobed capsule, with three cells and three valves: The *seeds* are many and roundish. Of this genus no fewer than 40 different species are enumerated by Linnæus, among which he includes the *cepa* and *porrum*, or onions and leeks.

1. The *sativum*, or garlic, has a bulbous root, of an irregularly roundish shape, with several fibres at the bottom; each root is composed of a number of lesser bulbs, called *cloves* of garlic, inclosed in one common

Allium.

membranous coat, and easily separable from one another. All the parts of this plant, but more especially the roots, have an acrimonious, and almost caustic taste, with a strong offensive smell, which last has induced those who preserved some of the species in gardens, on account of their yellow flowers, to eradicate them.

This pungent root warms and stimulates the solids, and attenuates tenacious juices; for which it is well adapted, on account of its being very penetrating; in-somuch that, when applied to the feet, its scent is soon discovered in the breath; and, when taken internally, its smell is communicated to the urine, or the matter of an issue, and perspires through the pores of the skin. Hence, in cold eucophlegmatic habits, it proves a powerful expectorant, diuretic, and emmenagogue; and, if the patient is kept warm, sudorific. It is also of great service in humoral asthmas and catarrhus disorders of the breast, and in other disorders proceeding from a laxity of the solids, and cold sluggish indispositions of the fluids. It is also frequently of service in the dropsy; in the beginning of which it is particularly recommended by Sydenham, as a warm strengthening medicine: we have even many examples where it acts so powerfully as a diuretic, as to carry off all the water of dropsies. It may be taken the length of a dram or two in substance for a dose.—We have a syrup and oxymel made with it, which may be employed for the same purposes as the garlic in substance; but they are mostly used in pulmonic disorders.—Externally applied, it inflames and ulcerates the skin, and is sometimes employed for this use in sinapisms. It has also been recommended by Sydenham as a most powerful revellent; for which purpose he was led to make use of it in the confluent small-pox. His method was to cut the root in pieces, and apply it, tied in a linen-cloth, to the soles of the feet, about the eighth day of the disease, after the face began to swell; renewing it once a-day till the danger was over.—When made into an unguent with oils, and applied externally, garlic is said to resolve and discuss cold tumors, and has been by some greatly celebrated in cutaneous disorders.

The acrimonious qualities of this root, however, render it manifestly improper on many occasions. Its liberal use is apt to occasion headaches, flatulencies, thirst, febrile heats, inflammatory distempers, and sometimes discharges of blood from the hemorrhoidal vessels. In hot bilious constitutions, where there is already a degree of irritation, where the juices are too thin and acrimonious, or the viscera unsound, it never fails to aggravate the distemper.

In Kamtschatka, the *allium ursinum*, or wild garlic, is very common and useful in medicine as well as food. Both Russians and natives gather it in great quantities for winter service. They steep it in water, then mix it with cabbage, onions, and other ingredients, and form out of them a ragout which they eat cold. It is also the principal remedy for the scurvy. As soon as this plant appears above the snow, they seem to put this dreadful disorder at defiance, and find a cure almost in its worst stages.

Garlic is very hardy, and will thrive in almost any soil or situation. It is easily propagated either by the roots or seeds. If from the roots, they ought to be planted in autumn, that they may take good root in the ground before the spring, which is necessary to make them flower strong the following sum-

mer. If they are propagated by seeds, they may be sown on a border of common earth, either in autumn soon after the seeds are ripe, or in the spring following; and will require no farther care than to keep them clear from weeds. In the following autumn, they may be transplanted into the borders where they are to remain.

2. The *ascalonicum*, or *eschalot*, was found wild in Palestine by Dr Hasselquist. The root is conglobate, consisting of many oblong roots bound together by thin membranes. Each of these small roots sends forth two or three fistulous, long, awl-shaped leaves, issuing from a sheath, and are nearly like those of the common onion. The flower-stem shoots from a membranaceous sheath; is round, almost naked, and terminated by a globular umbel of flowers, which have erect, purplish, lance-shaped petals, of the length of the stamina.—The root of this species is very pungent, has a strong, but not unpleasant smell, and therefore is generally preferred to the onion for making high-flavoured soups and gravies. It is also put into pickles, and in the East Indies they use an abundance of it for this purpose.

3. The *scorodoprasum*, or *rokambole*, grows naturally in Denmark and Sweden. It hath a heart-shaped solid root, which stands sidewise of the stalk. The leaves are broad, and are a little crenated on their edges. The flowers are of a pale purple colour, and collected into a globular head. The roots are used for the same purpose as the former.

4. The *schœnoprasum*, or *cives*, is an inhabitant of Siberia, and is a very small plant compared with the former, the leaves and stems seldom exceeding six inches in length, and the roots never producing any bulbs. The leaves are awl-shaped, hollow, and the stem naked. It was formerly in great request for mixing with salads in the spring, but has been little regarded lately. Its taste, smell, and virtues, are much the same as those of the common onion. It is propagated by parting the roots.

5. The *cepa*, or common onion, differs from the garlic only in the swelling pipy stalk, which is much larger in the middle than at either end.—From whence this was first brought into Europe is not known; but that it is not natural to Africa is beyond a doubt, it being evident that onions were eaten by the Egyptians above 2000 years before Christ; and they make a great part of their constant food to this day in Egypt. Dr Hasselquist says it is not to be wondered at that the Israelites should long for them after they had left this place; for whoever has tasted onions in Egypt must allow, that none can be had better in any part of the universe. Here, he observes, they are sweet, in other countries they are nauseous and strong. Here they are soft; whereas in the north and other parts they are hard, and their coats so compact that they are difficult to digest. They eat them roasted, cut into four pieces, with some bits of roasted meat, which the Turks call *kebab*; and with this dish they are so delighted, that they wish to enjoy it in paradise. They likewise make a soup of them in Egypt, which Hasselquist says is one of the best dishes he ever eat. The many ways of dressing onions in Britain are known to every family: but in regard to wholesomeness, there is certainly no method equal to boiling; as thus they are rendered mild, of easy digestion, and go off without leaving those heats in the stomach and bowels, which

Allium.

Allium. which they are apt to do any other way. Their nature is to attenuate thick, viscid juices; consequently a plentiful use of them in cold phlegmatic constitutions must prove beneficial. Many people shun them on account of the strong, disagreeable smell they communicate to the breath. This may be remedied by eating a few raw parsley leaves immediately after, which will effectually overcome the scent of the onions, and cause them to sit more easy on the stomach.

The varieties are, the Strasburgh, the Spanish, and the Egyptian onion. They are propagated by seeds, which should be sown the latter end of February, or the beginning of March, on good, light, rich ground, well dug and levelled, and cleared from weeds. They should also be sown at a time when the surface of the ground is not moist; and where they are intended for a winter crop, they must not be sown too thick. The common allowance is six pounds of seed to an acre; though some allow more, in order to have a crop to draw out, which they call *cullings*. In about six weeks after, the onions will be up and forward enough to hoe; at which time the weeds should be lightly cut up with a small hoe about two inches and a half broad, as also the onions themselves where they grow too close in bunches, leaving them at this first time at least two or three inches apart. This, if properly performed, and in a dry season, will preserve the ground clear of weeds at least a month, when they must be hoed over again, leaving them at this time about four or five inches asunder. In six weeks after they must be hoed a third time. The weeds are now to be carefully cut up, and the onions singled out so as to leave them about six inches square; by which means they will grow much larger than if left too close. This, if well performed, in case the weather proves dry, will keep the onions till they are fit to pull: but if the weather should prove moist, and any of the weeds take root again, the weeds must be pulled out with the hand; for the onions having now begun to bulb, must not be disturbed with a hoe. Towards the middle of August the onions will have arrived at their full growth, which may be known by their blades falling to the ground and shrinking. At this time, therefore, before their necks or blades are withered off, they should be drawn out of the ground, the extreme part of the blade cut off, and the onions laid upon a dry spot of ground, observing to turn them every other day at least, to prevent them from taking root again; which in moist weather they would be apt to do. At any rate, they are very apt to grow in the lofts where they are kept all winter; the most effectual method of preventing which is, with a hot iron, slightly to touch their beards or roots, which will effectually prevent their sprouting; but in doing this, great caution must be used not to scorch the pulp, for that will cause them to perish soon after. In order to save seeds, you must in the spring make choice of some of the largest, firmest, and best shapen onions (in quantity proportionable to the seed you intend to save), and having prepared a piece of good ground, which should be well dug, and laid out in beds about three feet wide, the onions must be planted in the beginning of March in the following manner: Having strained a line of about four inches within the side of the bed, you must with a spade throw out an opening six inches deep, the length of

the bed, into which you should place the onions with their roots downward, at about nine inches distance from each other; and with a rake draw the earth into the opening again to cover the bulbs; then proceed to remove the line again about a foot farther back, where you must make an opening as before, and so again, till the whole is finished, by which you will have four rows in each bed; between each bed you must allow the space of two feet for an alley to go among them. In a month's time the leaves will appear above ground, and many of the roots will produce three or four stalks each. About the beginning of June, when the flowers begin to appear, the stalks must be tied to stakes to prevent them from being broke by their own weight. About the end of August the seed will be ripe; which may be known by the opening of the cells which contain it, and its changing to a brown colour. When the heads are cut off, they should be spread abroad upon coarse cloths in the sun, observing to keep it under shelter in the night, as also in wet weather. When the heads are quite dry, the seeds should be beat out from them; and after being cleared from the husks, and exposed one day to the sun to dry, they may be put up in bags for use.

Besides the above-mentioned sorts of onions, the scallions or escallions, and Welsh onions, were formerly in great repute. The former is a sort which never forms any bulbs at the roots, and was chiefly used in the spring for green onions; but is now become so scarce as hardly to be known. Some gardeners, instead of the scallion, substitute such onions as decay and sprout in the house. These they plant in a bed early in the spring, and in a short time they become large enough for use. The true scallion is easily propagated by parting the roots either in spring or autumn; but the latter is preferable. The roots should be planted three or four in a hole, and about six inches distance every way. The Welsh onions are propagated only for spring use; they never make any bulbs, and are therefore fit only to be used green for salads. They are sown in the end of July, in beds about three feet and a half wide. In a fortnight's time they appear above ground; but in October their blades die, and the ground becomes quite naked. In January, however, they will again appear very strong, and in March will be fit to draw for young onions.

6. The porrum, or leek, has been so long cultivated, that its native place of growth cannot be traced. It is undoubtedly the same as that mentioned in the eleventh Chap. of Numbers, where it is said the Israelites longed for leeks in conjunction with onions. The leaves are much of the same nature as those of the latter, and they are yet a constant dish at the tables of the Egyptians, who chop them small and then eat them with their meat. They are in great esteem, too, with the Welsh, and their general use as a pot herb is well known. Their culture is the same with that of the onion.

ALLIX (Dr Peter), a learned French Protestant divine, born at Alencon in 1641. He became minister of the reformed church at Rouen, where he published many learned and curious pieces; the credit of which induced the reformed to call him to Charenton, about a league from Paris, being the principal church they

Allium,
Allix.

Alloa.

they had in France. On the revocation of the edict of Nantz, he retired to England; where he studied the language with so much success, as to publish a work, intitled *Reflections on the Books in the Holy Scriptures, to establish the Truth of the Christian Religion*, 2 vols; which he dedicated to James II. acknowledging his obligations to that prince, and his kind behaviour to the distressed refugees in general. He wrote several other treatises relating to ecclesiastical history; which rendered him as famous in England as in France, for his ingenious and solid defences of the reformed religion. He was complimented with the degree of D. D. and in 1690 was made treasurer of the church of Salisbury. He died in 1717.

ALLOA, or ALLOWAY, a sea-port town in Scotland, seated on the Forth, about 20 miles higher up the river than Leith, and five miles east of Stirling. It is a populous place; has two market days in the week; and is remarkable for its fine castle the seat of the earl of Mar, and for the coal-mines near it. The harbour is extremely commodious, with great depth of water; and vessels are expeditiously loaded with coals from the pits by an uncommon waggon-way, on which one horse draws with ease three waggons at once, each waggon containing a tun and a half. An excellent dry-dock has also lately been erected here, capable of receiving ships of the greatest burden. There is likewise a large glass-house for blowing bottles, of which vessels are supplied with any quantity upon the shortest notice.

The tower and lands of Alloa were exchanged by David II. king of Scots, anno 1365, with Thomas Lord Erskine, for the lands and estate of Strathgartney in Perthshire; and since that time the castle of Alloa has been the favourite residence of the family of Mar. The situation is uncommonly beautiful. The gardens here were the first that were laid out on a great scale in Scotland; and, with the advice of Le Nautre, were indebted to the taste of John the late earl of Mar, who began to plant them in the year 1706. They contain about 40 acres; and would have exhibited to Dr Johnson, had he travelled that way, as fine timber of fourscore years growth as his favourite England can produce.

The tower of Alloa is 89 feet in height, with walls of 11 feet in thickness; and was built in the end of the 13th century. In this residence of the family of Erskine many of the Scottish princes received their education, having been for more than two centuries the wards of the Lords Erskine and Earls of Mar; who held generally the castle of Stirling, and frequently the three principal fortresses of the kingdom, Edinburgh, Stirling, and Dumbarton. The last heir of the Scottish monarchy who was nurtered there was Henry Prince of Wales; whose cradle, golf-clubs, and other infantine and youthful remains, are preserved by the heir of the Earls of Mar, in remembrance of that spirited and promising prince; of whom Dr Birch has preserved several anecdotes, connected with the Erskines and his residence at Alloa. Among other remains of antiquity preserved at Alloa, in remembrance of the confidence and affection which subsisted always betwixt the Stuarts and the Erskines, is the private signet of the unfortunate Mary, which she gave to the regent Mar, after she was obliged by the treaty of Edinburgh

to desist from wearing the arms of England in the first quarter; the child's-chair of James VI. her son; and the festive-chair of Thomas Lord Erskine the second Earl of Mar of the name, with the fashionable grace carved on it, *Soli Deo Honor et Gloria*.

ALLOBROGES (Inscriptions, Livy, Velleius, Flarus); from *Allobrox* (Horace): a people of Gallia Narbonensis, situated between the rivers Isara and Rhodanus, and the Lacus Lemanus; commended by Cicero for their fidelity, discommended by Horace on account of their fondness for novelty.

ALLOCATION denotes the admitting or allowing of an article of an account, especially in the exchequer. Hence,

ALLOCATIONE Facienda, is a writ directed to the lord treasurer, or barons of the exchequer, commanding them to allow an accountant such sums as he has lawfully expended in the execution of his office.

ALLOCUTIO, an oration or speech of a general addressed to his soldiers, to animate them to fight, to appease sedition, or to keep them to their duty. A mount of earth was raised upon the occasion, as it were a kind of tribunal of turf. From this the general pronounced his harangue to the army, which was ranged in several squadrons round him, with their captains at their head. When the time and circumstances would not admit of a formal harangue, the general went through the ranks, and called each by his name, putting them in mind of their courage upon former occasions, mentioning the victories they had won, and making promises of plunder.

ALLODIUM, or ALLEUD, denotes lands which are the absolute property of their owner, without being obliged to pay any service or acknowledgment whatever to a superior lord. See FEE and FEODAL System.

ALLOPHYLLUS, in botany; a genus of the monogynia order, belonging to the octandria class of plants. The characters of which are: The *calyx* is a four-leaved perianthium, with orbicular leaflets, the opposite ones less: The *corolla* consists of four orbicular equal petals, less than the calyx; the claws broader, the length of the smaller leaves of the calyx: The *stamina* consist of eight slender filaments, the length of the corolla; the antheræ are roundish: The *pistillum* has a round didymous germen above; the stylus is filiform, and longer than the stamina; and the stigma is bifid, with revolute divisions. There is but one species, the *zelanicus*, a native of Ceylon.

ALLOTTING, or ALLOTMENT of Goods, in matters of commerce, is when a ship's cargo is divided into several parts, bought by divers persons, whose names are written on as many pieces of paper, which are applied by an indifferent person to the several lots or parcels; by which means the good are divided without partiality, every man having the parcel which the lot with his name on is appropriated.

ALLOY, or ALLAY, properly signifies a proportion of a baser metal mixed with a finer one. The alloy of gold is estimated by carats, that of silver by pennyweights. (See GOLD, &c.) In different nations, different proportions of alloy are used; whence their moneys are said to be of different degrees of fineness or baseness, and are valued accordingly in foreign exchanges. The chief reasons alleged for the alloying

of

Allum of coin are: 1. The mixture of the metals, which, when smelted from the mine, are not perfectly pure. **Almadie.** 2. The saving the expence it must otherwise cost if they were to be refined. 3. The necessity of rendering them harder, by mixing some parts of other metals with them, to prevent the diminution of weight by wearing in passing from hand to hand. 4. The melting of foreign gold or coin which is alloyed. 5. The charges of coinage, which must be made good by the profit arising from the money coined. 6. and lastly, The duty belonging to the sovereign, on account of the power he has to cause money to be coined in his dominions.

In a more general sense, the word is employed in chemistry to signify the union of different metallic matters.—As an infinity of different combinations may be made according to the nature, the number, and the proportions of the metallic matters capable of being alloyed, we shall not here enter into the detail of the particular alloys, all which are not yet nearly known. Those which are used, as *Brönze, Tombac, Bräfs, White Copper*, &c. may be found under their particular names; and what is known concerning other alloys may be found under the names of the different metals and semi-metals.

ALLUM. See **ALUM.**

ALLUMINOR, from the French *alumer*, “to lighten,” is used for one who coloureth or painteth upon paper or parchment; and the reason is, because he gives light and ornament by his colours to the letters or other figures. Such ornaments are styled *illuminations*. The word is used in stat. 1 R. III. cap. 9. But now such a person is called a *limner*.

ALLUSH (anc. geog.). The Israelites being in the wilderness of Shur, departed from Dophkah, and went to Allush, from whence they proceeded to Rephidim; Num. xxxiii. 13, 14. Eusebius and St Jerom fix Allush in Idumæa, about Gabala or Petra, the capital of Arabia Petræa. In the accounts of the empire, it is situated in the third Palestine; and by Ptolemy, among the cities of Idumæa.

ALLUSION, in rhetoric, a figure by which something is applied to, or understood of, another, on account of some similitude between them.

ALLUVION, in law, denotes the gradual increase of land along the sea-shore, or on banks of rivers.

ALLY, in matters of polity, a sovereign prince or state that has entered into alliance with others. See **ALLIANCE**.

ALMACANTARS. See **ALMUCANTARS**.

ALMACARRON, a sea-port town of Spain, in the province of Murcia, at the mouth of the river Guadalatin. It is about twenty miles west of Carthage, and is remarkable for the prodigious quantity of alum found in its territory. W. Long. 1. 15. N. Lat. 37. 40.

ALMADE, a town of Spain, in the province of La Mancha, in the kingdom of Castile, situated upon the top of a mountain, where are the most ancient as well as the richest silver mines in Europe.

ALMADIE, a kind of cano, or small vessel, about four fathoms long, commonly made of bark, and used by the negroes of Africa.

ALMADIE is also the name of a kind of long-boats, fitted out at Calicut, which are eighty feet in length,

and six or seven in breadth. They are exceedingly swift, and are otherwise called *cathuri*.

ALMAGEST, in matters of literature, is particularly used for a collection or book composed by Ptolemy, containing various problems of the ancients both in geometry and astronomy.

ALMAGEST is also the title of other collections of this kind. Thus, Riccioli has published a book of astronomy, which he calls the *New Almagest*; and Plukenet, a book which he calls *Almagestum Botanicum*.

ALMAGRA, a fine deep red ochre, with some admixture of purple, very heavy, and of a dense yet friable structure, and rough dusty surface. It adheres very firmly to the tongue, melts freely and easily in the mouth, is of an austere and strongly astringent taste, and stains the skin in touching. It is the *Sil Atticum* of the ancients: it ferments very violently with acid menstruums; by which single quality, it is sufficiently distinguished from the *Sil Syricum*, to which it has in many respects a great affinity. It is found in immense quantities in many parts of Spain; and in Andalusia there are in a manner whole mountains of it. It is used in painting, and in medicine as an astringent.

ALMAGRO, a fortress of Spain, the capital of one of the districts of La Mancha. It was built by the archbishop Roderic of Toledo, who finished it in 1214, and put a considerable garrison into it to restrain the incursions of the Moors. This was hardly done, when the fortress was besieged by an army of 5000 horse and foot, under the command of a Moorish officer of great reputation; but the prelate, its founder, took care to supply those within with such plenty of necessities, that at length the enemy found themselves obliged to raise the siege and retire with great loss.

ALMANACK, a book, or table, containing a calendar of days and months, the rising and setting of the sun, the age of the moon, the eclipses of both luminaries, &c.—Authors are divided with regard to the etymology of the word; some deriving it from the Arabic particle *al*, and *manach*, to count; some from *al-manah*, new-year's gifts, because the Arabian astrologers used at the beginning of the year to make presents of their ephemerides; and others, from the Teutonic *almaen-achte*, observations on all the months. Mr Johnson derives it from the Arabic particle *al*, and the Greek *μην*, a month. But the most simple etymology appears from the common spelling; the word being composed of two Arabic ones, *Al Manack*, which signify *the Diary*. All the classes of Arabs are commonly much given to the study of astronomy and astrology; to both which a pastoral life, and a sort of husbandry, not only incline them, but give them time and leisure to apply themselves to them. They neither sow, reap, plant, travel, buy or sell, or undertake any expedition or matter, without previously consulting the stars, or, in other words, their almanacks, or some of the makers of them. From these people, by their vicinity to Europe, this art, no less useful in one sense than stupid and ridiculous in another, hath passed over hither: and those astronomical compositions have still every where not only retained their old Arabic name; but were, like theirs, for a long while, and still are among many European nations, interspersed with a great number of astrological rules for planting, sowing, bleeding, purging, &c. down to the cutting of the hair and paring of

Almagest
||
Almanack.

Almanack of the nails.—Regiomontanus appears to have been the first in Europe, however, who reduced almanacks into their present form and method, gave the characters of each year and month, foretold the eclipses and other phases, calculated the motions of the planets, &c. His first almanack was first published in 1474.

Almanacks differ from one another, chiefly, in containing some more, others fewer, particulars.

The essential part is the calendar of months and days, with the risings and settings of the sun, age of the moon, &c. To these are added various parerga, astronomical, meteorological, chronological, political, rural, &c. as calculations and accounts of eclipses, solar ingresses, prognostics of the weather, tables of the tides, terms, &c. lists of posts, offices, dignities, public institutions, with many other articles political as well as local, and differing in different countries.—A great variety are annually published in Britain; some for binding, which may be denominated *book-almanacks*; others in loose papers, called *sheet-almanacks*.

The modern almanack answers to the *Fasti* of the ancient Romans. See FASTI.

Construction of ALMANACKS. The first thing to be done is, to compute the sun's and moon's place for each day of the year, or it may be taken from some ephemerides and entered into the almanack; next, find the dominical letter, and, by means thereof, distribute the calendar into weeks; then, having computed the time of Easter, by it fix the other moveable feasts; adding the immoveable ones, with the names of the martyrs, the rising and setting of each luminary, the length of day and night, the aspects of the planets, the phases of the moon, and the sun's entrance into the cardinal points of the ecliptic, *i. e.* the two equinoxes and solstices. (See ASTRONOMY, *passim*.) By the help of good astronomical tables or ephemerides, the construction of almanacks is extremely easy.

Almanacks for one year printed on one side of paper, pay of duty 4d.; those for more years pay for three years 1d.; but perpetual almanacks are to pay only for three years at 2d. Out of the duties by this act there shall be paid to each university L. 500 *per ann.* half yearly, at Midsummer and Christmas, and the surplus shall be paid into the exchequer to go to the sinking fund. Selling unstamped almanacks incurs the same penalty as for selling unstamped newspapers. Almanacks in bibles and common prayer-books are exempted.

ALMANACK, among antiquaries, is also the name given to a kind of instrument, usually of wood, inscribed with various figures and Runic characters, and representing the order of the feasts, dominical letters, days of the week, and golden number, with other matters necessary to be known throughout the year; used by the ancient northern nations, in their computations of time, both civil and ecclesiastical. Almanacks of this kind are known by various names, among the different nations wherein they have been used; as *rimstocks*, *primstaries*, *runstocks*, *runstuffs*, *Scipiones Runicæ*, *Bacculi Annales*, clogs, &c. They appear to have been used only by the Swedes, Danes, and Norwegians. From the second of these people, their use was introduced into England, whence divers remains of them in the counties. Dr Plot has given the description and figure of one of these clogs, found in

Staffordshire, under the title of *The perpetual Staffordshire Almanack*. The external figure and matter of these calendars appear to have been various. Sometimes they were cut on one or more wooden leaves, bound together after the manner of books; sometimes on the scabbards of swords, or even on daggers; sometimes on tools and implements, as portable steelyards, hammers, the helms of hatchets, flails, &c. Sometimes they were made of brass or horn; sometimes of the skins of eels, which, being drawn over a stick properly inscribed, retained the impressions of it. But the most usual form was that of walking-staves, or sticks, which they carried about with them to church, market, &c. Each of these staves is divided into three regions; whereof the first indicates the signs, the second the days of the week and year, and the third the golden number. The characters engraven on them are, in some, the ancient Runic; in others the later Gothic characters of Ulfilus. The saints days are expressed in hieroglyphics, significative either of some endowment of the saint, the manner of his martyrdom, or the like. Thus, against the notch for the first of March, or St David's day, is represented a harp; against the 25th of October, or Crispin's day, a pair of shoes; against the 10th of August, or St Lawrence's day, a gridiron; and, lastly, against New-year's day, a horn, the mark of good drinking, which our ancestors gave a loose to at that season.

ALMANZA, a little town of New-Castile, on the frontiers of the kingdom of Valencia in Spain, situated in W. Long. 1. 19. N. Lat. 38. 54. It is remarkable for the defeat of the allies in 1707, under the Marquis de las Minas and the Earl of Galway. In the beginning of this action, the English troops penetrated thro' the centre of the Spanish army; but the Portuguese cavalry being broken by the Spanish, and the French infantry making a dreadful fire on their flanks, the allied army was at last broken, and began their retreat when it was almost dark. Colonel Hill carried off the remains of thirteen battalions towards the river Xucar, which, if they could have passed, they might have been safe: but being very much fatigued, they were obliged to halt; by which means they were surrounded, and forced to surrender prisoners of war. In this battle, the allies lost 120 standards, together with all their artillery and baggage; a great number were killed, and several thousands taken prisoners. The Marquis de las Minas was dangerously wounded; and his mistress, in the garb of an amazon, killed by his side. The earl of Galway had two cuts cross the face, which, though not dangerous, had prevented him from seeing, or giving orders properly.

HERESY OF ALMARIC, a tenet broached in France by one Almaric, in the year 1209. It consisted in affirming, that every Christian was actually a member of Christ; and that without this faith no one could be saved. His followers went farther, and affirmed, that the power of the Father lasted only during the continuance of the Mosaic law; that the coming of Christ introduced a new law; that at the end of this began the reign of the Holy Ghost; and that now confession and the sacraments were at an end, and that every one is to be saved by the internal operations of the Holy Spirit alone, without any external act of religion.—Their morals were as infamous as their doctrine

Almanza,
Heresy of
Almaric.

Alme. was absurd. Their tenets were condemned by a public decree of the council of Sens, in the year 1209.

ALME, or ALMA, singing and dancing girls in Egypt, who, like the Italian *Improvvisatori*, can occasionally pour forth "unpremeditated verse." They are called *Almé*, from having received a better education than other women. They form a celebrated society in this country. To be received into it, according to Mr Savary, it is necessary to have a good voice, to understand the language well, to know the rules of poetry, and be able to compose and sing couplets on the spot, adapted to the circumstances. The *Almé* know by heart all the new songs. Their memory is furnished with the most beautiful tales. Their is no festival without them; no entertainment of which they do not constitute the ornament. They are placed in a rostrum, from whence they sing during the repast. They then descend into the saloon, and form dances which have no resemblance to ours. They are pantomime ballets, in which they represent the usual occurrences of life. The mysteries of love, too, generally furnish them with scenes. The suppleness of their bodies is inconceivable. One is astonished at the mobility of their features, to which they give at pleasure the impression suited to the characters they play. The indecency of their attitudes is often carried to excess. Their looks, their gestures, every thing speaks, but in so expressive a manner, that it is impossible to mistake them. At the beginning of the dance, they lay aside with their veils the modesty of their sex. A long rob of very thin silk goes down to their heels, which is slightly fastened with a rich girdle. Long black hair, plaited and perfumed, is flowing on their shoulders. A shift, transparent as gauze, scarcely hides their bosom. As they put themselves in motion, the shapes, the contours of their bodies, seem to develop themselves successively. Their steps are regulated by the sound of the flute, of castanets, the tambour de basque, and cymbals, which accelerates or retards the measure. They are still further animated by words adapted to such scenes. They appear in a state of intoxication. They are the Bacchantes in a delirium. It is when they are at this point, that throwing off all reserve, they abandon themselves totally to the disorder of their senses; it is then that a people far from delicate, and who like nothing hidden, redouble their applauses. These *Almé* are sent for into all the harems. They teach the women the new airs; they amuse them with amorous tales, and recite in their presence poems, which are so much the more interesting, as they furnish a lively picture of their manners. They initiate them into the mysteries of their art, and teach them to contrive lascivious dances. These girls, who have a cultivated understanding, are very agreeable in conversation. They speak their language with purity. The habit of dedicating themselves to poetry renders the softest and most sonorous expressions familiar to them. They repeat with a great deal of grace. In singing, nature is their only guide. Sometimes two of them sing together, but always with the same voice. It is the same with an orchestra, where all the instruments playing in unison execute the same part.

The *Almé* assist at the marriage-ceremonies, and march before the bride, playing on instruments. They make a figure likewise at funerals, and accompany the

VOL. I. Part II.

procession, singing sorrowful airs. They break forth into groans and lamentations, and give every sign of grief and despair. These women are paid very high, and seldom appear but amongst the grandees and rich men.

The common people have also their *Almé*. They are girls of the second class, who try to imitate the former; but they have neither their elegance, their graces, nor their knowledge. They are every where to be met with. The public places and the walks about Grand Cairo are full of them. As the populace require allusions still more strongly marked, decency will not permit the relation to what a pitch they carry the licentiousness of their gestures and attitudes.

ALMEDIA, a frontier town of Portugal, in the province of Tralos Montes, on the confines of Leon, where there was a very brisk action between the French and Portuguese in 1663; 17 miles N. W. of Ciudad Rodrigo. W. Long. 7 10. N. Lat. 40. 41.

ALMEHRAB, in the Mahometan customs, a nich in their mosques, pointing towards the kebla or temple of Mecca, to which they are obliged to bow in praying. See KEBLA.

ALMEISAR, a celebrated game among the ancient Arabs, performed by a kind of casting of lots with arrows, strictly forbid by the law of Mahomet, on account of the frequent quarrels occasioned by it.

The manner of the game was thus: A young camel being brought and killed, was divided into a number of parts. The adventurers, to the number of seven, being met, 11 arrows were provided without heads or feathers; seven of which were marked, the first with one notch, the second with two, the third with three, &c. the other four had no marks. These arrows were put promiscuously into a bag, and thus drawn by an indifferent person. Those to whom the marked arrows fell, won shares in proportion to their lot; the rest to whom the blanks fell, were intitled to no part of the camel, but obliged to pay the whole price of it. Even the winners tasted not of the flesh themselves more than the losers, but the whole was distributed to the poor.

ALMENE, in commerce, a weight of two pounds used to weigh saffron in several parts of the continent of the E. Indies.

ALMERIA, a sea-port town in the kingdom of Granada in Spain, pleasantly situated in a fine bay at the mouth of the river Almeria, on the Mediterranean; W. Long. 3. 20. N. Lat. 36. 51. This town is by some thought to have risen upon the ruins of the ancient Abdera, and was formerly a place of great consequence. It was taken from the Moors in 1147, by the emperor Conrad III. in conjunction with the French, Genoese, and Pisans.—It was at that time the strongest place in Spain, held by the infidels; from which their privateers, which were exceedingly numerous, not only troubled the sea-coasts inhabited by the Christians, but gave equal disturbance to the maritime provinces of France, Italy, and the adjacent islands. The city being well fortified, having a strong castle, a numerous garrison, and being excellently provided with every thing necessary, made a vigorous resistance; but was at last taken by storm, when the victor put to the sword all the inhabitants who were found in arms, distributing the best part of the plunder among his al-

Almeria lies, whom he sent away thoroughly satisfied. The Genoese, particularly, acquired here that emerald vessel which still remains in their treasury, and is deemed invaluable.

Upon its reduction by the Christians Almeria became a bishopric; but is at present very little better than a village, indifferently inhabited, and has nothing to testify so much as the probability of its former greatness, except certain circumstances which cannot be effaced even by the indolence of the Spaniards themselves. What these are, Udal ap Rhys, a Welshman, thus describes, in his tour through Spain and Portugal. "Its climate (says he) is so peculiarly blessed, that one really wants words to express its charms and excellence. Its fields and meads are covered with flowers all the year round; they are adorned also with palms, myrtles, plane-trees, oranges, and olives; and the mountains and promontories near it are as noted for their producing a great variety of precious stones, insomuch that the next promontory to it is called the *Cape of Gates*, which is a corruption from the word *agates*, the hills thereabouts abounding in that sort of precious stones, as well as in emeralds and amethysts, granites or coarse rubies, and extreme curious alabaster in the mountains of Filaures."

ALMISSA, a small but strong town at the mouth of the Cetina, in Dalmatia, famous for its piracies; ten miles east of Spalatro. E. Long. 39. 33. N. Lat. 43. 56.

ALMOND, the fruit of the almond-tree. See AMYGDALUS.

ALMOND, in commerce, a measure by which the Portuguese sell their oil; 26 almonds make a pipe.

ALMONDS, in anatomy, a name sometimes given to two glands, generally called the *tonsils*.

ALMONDS, among lapidaries, signify pieces of rock-crystal, used in adorning branch-candlesticks, &c. on account of the resemblance they bear to the fruit of that name.

ALMOND-Furnace, among refiners, that in which the slags of litharge, left in refining silver, are reduced to lead again by the help of charcoal.

ALMONDBURY, a village in England, in the west-riding of Yorkshire, six miles from Halifax.

ALMONER, in its primitive sense, denotes an officer in religious houses, to whom belonged the management and distribution of the alms of the house. By the ancient canons, all monasteries were to spend at least a tenth part of their income in alms to the poor. The almoner of St Paul's is to dispose of the monies left for charity, according to the appointment of the donors, to bury the poor who die in the neighbourhood, and to breed up eight boys to singing, for the use of the choir. By an ancient canon, all bishops are required to keep almoners.

Lord ALMONER, or Lord High ALMONER, of England, is an ecclesiastical officer, generally a bishop, who has the forfeiture of all deodands, and the goods of *felos de se*, which he is to distribute among the poor. He has also, by virtue of an ancient custom, the power of giving the first dish from the king's table to whatever poor person he pleases, or, instead of it, an alms in money.

Great ALMONER, Grand AUMONIER, in France, is

the highest ecclesiastical dignity in that kingdom. To Almoner him belongs the superintendency of all hospitals and houses of lepers. The king receives the sacrament from his hand; and he says mass before the king in all grand ceremonies and solemnities.

ALMONER is also a more fashionable title given by some writers to chaplains. In this sense we meet with almoner of a ship, almoner of a regiment.

ALMONRY, or AUMBRY, the office or lodgings of the almoner; also the place where alms are given. See AMBRY.

ALMS, a general term for what is given out of charity to the poor.

In the early ages of Christianity, the alms of the charitable were divided into four parts; one of which was allotted to the bishop, another to the priests, and a third to the deacons and subdeacons, which made their whole subsistence; the fourth part was employed in relieving the poor, and in repairing the churches.

No religious system is more frequent or warm in its exhortations to alms-giving than the Mahometan. The Alcoran represents alms as a necessary means to make prayer be heard. Hence that saying of one of their khalifs: "Prayer carries us half-way to God, fasting brings us to the door of his palace, and alms introduces us into the presence-chamber." Hence many illustrious examples of this virtue among the Mahometans. Hasan, the son of Ali, and grandson of Mohammed, in particular, is related to have thrice in his life divided his substance equally between himself and the poor, and twice to have given away all he had. And the generality are so addicted to the doing of good, that they extend their charity even to brutes.

ALMS, also denotes lands or other effects left to churches or religious houses, on condition of praying for the soul of the donor. Hence,

Free ALMS was that which is liable to no rent or service.

Reasonable ALMS was a certain portion of the estates of intestate persons, allotted to the poor.

ALMS-Box, or Chest, a small chest, or coffer, called by the Greeks *καθαλιον*, wherein anciently the alms were collected, both at church and at private houses.

The alms-chest in English churches, is a strong box, with a hole in the upper part, having three keys, one to be kept by the parson or curate, the other two by the church-wardens. The erecting of such alms-chest in every church is enjoined by the book of canons, as also the manner of distributing what is thus collected among the poor of the parish.

ALMS-House, a petty kind of hospital, for the maintenance of a certain number of poor, aged, or disabled people.

ALMUCANTARS, in astronomy, an Arabic word denoting circles of the sphere passing through the centre of the sun, or a star, parallel to the horizon, being the same as *PARALLELS of Altitude*.

ALMUCANTARS-Staff, is an instrument usually made of pear-tree or box, having an arch of 15 degrees; used to take observations of the sun, about the time of its rising and setting; in order to find the amplitude, and consequently the variation of the compass.

ALMUCIUM, denotes a kind of cover for the head, worn chiefly by monks and ecclesiastics: It was of a square

Almugim square form, and seems to have given rise to the bonnets of the same shape still retained in universities and cathedrals.

Alnwick.

ALMUGIM, or **ALMUG-TREE**, a certain kind of wood mentioned in the first book of Kings, (x. 11.), which the Vulgate translates *ligna thyina*, and the Septuagint wrought wood. The Rabbins generally render it coral; others, *ebony*, *brazil*, or *pine*. But it is observed, that the almug-tree can by no means be coral, because that wood is not fit for the purposes that the Scripture tells us the almug-tree was used, such as musical instruments, stair-cases, &c. The word *thyinum* is a name for the citron-tree, known to the ancients, and very much esteemed for its sweet odour and great beauty. It came from Mauritania. The almug-tree, or almugim, al gumim, or simply gummim, taking *al* for a kind of article, is therefore by the best commentators understood to be an oily and gummy sort of wood; and particularly that sort of tree which produces the gum ammoniac, which is also thought to be the same with the shittim-wood, whereof there is such frequent mention made by Moses.

ALMUNECAR, a sea-port town in the kingdom of Granada, seated on the Mediterranean, with a good harbour, defended by a strong castle, 20 miles south of Alhama. W. Long. 3. 45. N. Lat. 36. 50.

ALNAGE, or **AULNAGE**, the measuring of woollen manufactures with an ell. It was at first intended as a proof of the goodness of that commodity; and accordingly a seal was invented as a mark that the commodity was made according to the statute; but, it being now possible to purchase these seals, they are affixed, whenever the vender pleases, to all cloths indiscriminately, to the great prejudice of our woollen manufactures.

ALNAGER, **ALNEGER**, or **AULNEGER**, q. d. *measurer by the ell*, signifies a sworn public officer, who, by himself or deputy, is to look to the assize of woollen cloth made throughout the land, i. e. the length, width, and work thereof; and to the seals for that purpose ordained. The office of king's aulnager seems to have been derived from the statute of Richard I. A. D. 1197, which ordained, that there should be only one weight and one measure throughout the kingdom; and that the custody of the assize, or standard of weights and measures, should be committed to certain persons in every city and borough. His business was, for a certain fee, to measure all cloths made for sale, till the office was abolished by the statute 11 and 12 W. III. cap. 20.

ALNUS, the **ALDER-TREE**, a species of *betula*. See **BETULA**.

ALNUS, in the ancient theatres, that part which was most distant from the stage.

ALNWICK, a thoroughfare town in Northumberland, on the road to Scotland. Here Malcolm, king of Scotland, making an inroad into Northumberland, was killed, with Edward his son, and his army defeated by Robert Mowbray, earl of this county, anno 1092. Likewise William, king of Scotland, in 1174, invading England with an army of 80,000 men, was here encountered, his army routed, and himself made prisoner. The town is populous, and in general well built; it has a large town-house, where the quarter-sessions and county-courts are held, and members of

parliament elected. It has a spacious square, in which a market is held every Saturday. Alnwick appears to have been formerly fortified, by the vestiges of a wall still visible in many parts, and three gates which remain almost entire. It is governed by four chamberlains, who are chosen once in two years out of a common council, consisting of 24 members. It is ornamented by a stately old Gothic castle, which has been the seat of the noble family of Piercy, earls of Northumberland. As the audits for receipt of rents have ever been in this castle, it has always been kept in tolerable repair; and not many years ago, it was repaired and beautified by the Duke of Northumberland, who made very considerable alterations, upon a most elegant plan, with a view to reside in it some part of the summer-season. The manner of making freemen is peculiar to this place, and indeed is as ridiculous as singular. The persons who are to be made free, or, as the phrase is, leap the well, assemble in the market-place, very early in the morning, on the 25th of April, being St Mark's day. They appear on horse-back, with every man his sword by his side, dressed in white, and with white night-caps, attended by the four chamberlains and the castle-bailiff, mounted and armed in the same manner; from hence they proceed, with music playing before them, to a large dirty pool, called *Freeman's-well*, where they dismount, and draw up in a body, at some distance from the water; and then rush into it all at once, and scramble through the mud as fast as they can. As the water is generally very foul, they come out in a dirty condition; but taking a dram, they put on dry clothes, remount their horses, and ride full gallop round the confines of the district; then re-enter the town, sword in hand, and are met by women dressed in ribbons with bells and garlands, dancing and singing. These are called *timber-waifs*. The houses of the new freemen are on this day distinguished by a great holly-bush, as a signal for their friends to assemble and make merry with them after their return. This ceremony is owing to king John, who was mired in this well, and who, as a punishment for not mending the road, made this a part of their charter. Alnwick is 310 miles north by west from London, 33 north of Newcastle, and 29 south of Berwick. Long. 1. 10. Lat. 55. 24.

ALOA, in Grecian antiquity, a festival kept in honour of Ceres by the husbandmen, and supposed to resemble our harvest-home.

ALOE, in botany, a genus of the monogynia order, belonging to the hexandria class of plants; and, in the natural method, ranking under the 10th order, *Coronaria*. The characters are: There is no calyx: The corolla is monopetalous, erect, six-cleft, and oblong; the tube gibbous; the border spreading, and small; with a nectary-bearing bottom: The stamina consist of six subulated filaments, rather surpassing the corolla in length, and inserted into the receptacle; the antheræ are oblong and incumbent: The pistillum has an ovate germen; the stylus is simple, the length of the stamina; the stigma is obtuse and trifid: The pericarpium is an oblong capsule, three-furrowed, three-celled, three-valved: The seeds are many and angular. Of this genus, botanical writers enumerate ten species; of which the most remarkable are,

1. The disticha, by some called the soap aloe, by others

Aloe: others *caballine aloe*. This seldom rises above two feet high. The leaves are very broad at the base, where they closely embrace the stalk, and gradually decrease to a point. The edges are set with sharp spines, and the under leaves spread open horizontally every way. These are of a dark green colour, spotted with white, somewhat resembling the colour of soft soap, from whence the plant got the name of *soap-aloe*. The flowers grow in umbels on the tops of the stalks, are of a beautiful red colour, and appear in August and September. 2. The *variegata*, or partridge-breast aloe, is a low plant, seldom rising above eight inches high. The leaves of this are triangular, and curiously veined and spotted, somewhat like the feathers of a partridge's breast. The flowers grow in very loose spikes, and are of a fine red colour, tipped with green. 3. The *viscosa*, with funnel-shaped flowers, grows near a foot high, with triangular leaves of a dark green colour. The flowers grow thinly upon very slender footstalks, are of an herbaceous colour, and their upper part turns backward. 4. The *spiralis*, with oval crenated flowers, grows somewhat like the former; only the flowers grow upon taller stalks, which branch out and grow in very long close spikes. 5. The *linguisformæ*, or tongue-aloe, has its leaves about six inches in length, and shaped like a tongue. The flowers grow in slender loose spikes, each hanging downward, of a red colour below, and green at the top. 6. The *margaritifera*, or pearl aloe, is a very beautiful plant. It is smaller than most of the aloe kind. The leaves are short, very thick, sharp pointed, and turning down, with a large thick end, appear there triangular. The colour of the leaves is a fine green, striped in an elegant manner with white, and frequently tipped with red at the point. The flower-stalk, which rises in the midst of the leaves, is round, smooth, of a purple colour, and generally about eight inches high. When the plant has been properly cultivated, the flowers are striped with green and white; and sometimes they are entirely white. This aloe is singular in not having the bitter resinous juice with which the leaves of most others abound; when a leaf of this species is cut, what runs from it is watery, colourless, and perfectly insipid. 7. The *perfoliata*, or focotorine aloe, hath long, narrow, succulent leaves, which come out without any order, and form large heads. The stalks grow three or four feet high; and have two, three, and sometimes four, of these heads branching out from it. The flowers grow in long spikes, each standing on a pretty long footstalk; they are of a bright red colour, tipped with green, and generally appear in the winter-season. 8. The *retusa*, or cushion aloe, hath very short, thick, succulent leaves, compressed on the upper side like a cushion. This grows very close to the ground; the flowers grow on slender stalks, and are of an herbaceous colour.

Culture. The proper earth for planting these vegetables in, is, one half fresh light earth from a common, and the rest an equal mixture of white sea-sand and sifted lime-rubbish. This mixture should be always made six or eight months before the plants are to be set in it. The common aloe will live in a dry greenhouse in winter; and may be placed in the open air in summer, in a sheltered situation; but must have very little water. Most of the other aloes are best preserved

in an airy glass-case, in which there is a stove, to make a little fire in very bad weather. The tenderest kinds require a greater share of heat to preserve them in winter, and should be kept in a good stove, in a degree of heat ten degrees above temperate. Many other kinds may also be kept in this heat; but the greater the heat, the more water they always require. About the beginning of June, it is usual in England to set the pots of aloes out of the house; but they should be set under the shelter of hedges or trees, to keep them from the violence of the sun; the rains also, which usually fall in this and the following month, are apt to rot them. It is therefore best to keep them under cover the greatest part of the year. The best time to shift these plants is the middle of July. They are, on this occasion, to be taken out of the pots, the loose earth to be picked from about their roots, and the decayed or mouldy parts of them cut off; then a few stones are to be put at the bottom of the pot, and it is to be filled with the composition before described, and the plants carefully put in, the roots being so disposed as not to interfere with one another. They are to be carefully watered after this, at times, for three weeks, and set in a shady place. The common kind will bear the open air from May to October, and should be shifted every year. All the aloes are propagated by off-sets, or by planting the leaves. The off-sets should be taken from the mother-plant, at the time when it is shifted: they are to be planted in very small pots of the proper mixed earth; and if that part of them which joined to the mother-plant be observed to be moist when taken off, it should lie on the ground in a shady place two or three days before it is planted, otherwise it will rot. After planting these, they should remain in a shady place a fortnight; and then be removed to a very moderate hot-bed, plunging the pots therein, which will help their striking new roots. Towards the end of August, they must be, by degrees, hardened to the open air, by taking off the glasses of the hot-bed; and in September they may be removed into the green-house.

Properties, &c. The aloe is a kind of symbolic plant to the Mahometans, especially in Egypt, and in some measure dedicated to the offices of religion; for whoever returns from a pilgrimage to Mecca, hangs it over his street-door, as a token of his having performed that holy journey. The superstitious Egyptians believe that this plant hinders evil spirits and apparitions from entering the house; and on this account, whoever walks the streets in Cairo will find it over the doors both of Christians and Jews. From the same plant the Egyptians distil a water, which is sold in the apothecaries shops at Cairo, and recommended in coughs, hysterics, and asthma. An unexperienced French surgeon, says Hasselquist, gave a Coptite, 40 years old, afflicted with the jaundice, four tea-cups full of the distilled water of this species of aloe, and cured him in four days. This remedy, unknown to our apothecaries, is not difficult to be obtained, as the plant might easily be raised in the warm southern parts of Europe. The Arabians call it *sabbara*.

Of the leaves of the Guinea aloe, mentioned by Mr Adanson, in his voyage to Senegal, the negroes make very good ropes, not apt to rot in the water.

Dr Sloane mentions two sorts of aloe; one of which

Aloe. is used for fishing-lines, bow-strings, stockings, and hammocks; the other has leaves which, like those of the wild-pine and banana, hold rain-water, and thereby afford a very necessary refreshment to travellers in hot countries, where there is generally a scarcity of wells and water.

In Mexico, the *maguel*, a species of aloe, yields almost every thing necessary to the life of the poor. Besides making excellent hedges for their fields, its trunk served in place of beams for the roofs of their houses, and its leaves instead of tiles. From those leaves they obtained paper, thread, needles, clothing, shoes, and stockings, and cordage; and from its copious juice they made wine, honey, sugar, and vinegar. Of the trunk, and thickest part of the leaves, when well baked, they made a very tolerable dish of food. Lastly, it was a powerful medicine in several disorders, and particularly in those of the urine. It is also at present one of the plants the most valued and most profitable to the Spaniards.

The medical substance known by the name of *aloes* is the inspissated juice of some of the abovementioned species. The ancients distinguished two sorts of aloes; the one was pure and of a yellowish colour, inclining to red, resembling the colour of a liver, and thence named *hepatic*; the other was full of impurities, and hence supposed to be only the dross of the better kind. At present, various sorts are met with in the shops; which are distinguished either from the places, from the species of the plants, or from some difference in the juices themselves. These may be all ranged in three classes:

1. *ALOE Perfoliata*, socotorine aloes, brought from the island Socotora in the Indian ocean, wrapt in skins; it is obtained from the 15th species abovementioned.—This sort is the purest of the three: it is of a glossy surface, clear, and in some degree pellucid; in the lump, of a yellowish red colour, with a purple cast; when reduced to powder, of a bright golden colour. It is hard and friable in the winter, somewhat pliable in summer, and grows soft betwixt the fingers. Its taste is bitter, accompanied with an aromatic flavour, but insufficient to prevent its being disagreeable: the smell is not very unpleasant, and somewhat resembles that of myrrh.

2. *ALOE Hepatica*, hepatic, Barbadoes, or common aloes (the juice of a variety of the former), is not so clear and bright as the foregoing sort; it is also of a darker colour, more compact texture, and for the most part drier. Its smell is much stronger and more disagreeable; the taste intensely bitter and nauseous, with little or nothing of the fine aromatic flavour of the socotorine.—The best hepatic aloes come from Barbadoes in large gourd-shells; an inferior sort of it (which is generally soft and clammy) is brought over in casks.

Of the cultivation and preparation of hepatic aloes in the island of Barbadoes, we have the following account in the London Medical Journal*. “The lands in the vicinity of the sea, that is, from two to three miles, which are rather subject to drought than otherwise, and are so stony and shallow as not to admit of the planting of sugar canes with any prospect of success, are generally found to answer best for the aloe plant. The stones, at least the larger ones, are first picked up, and either packed in heaps, upon the most

shallow barren spots, or laid round the field as a dry wall. The land is then lightly ploughed, and very carefully cleared of all noxious weeds, lined at one foot distance from row to row, and the young plants set, like cabbages, at about five or six inches from each other. This regular mode of lining and setting the plants is practised only by the most exact planters, in order to facilitate the weeding of them, by hand, very frequently; because, if they are not kept perfectly clean and free from weeds, the produce will be but very small. They will bear being planted in any season of the year, even in the driest, as they will live on the surface of the earth for many weeks without a drop of rain. The most general time, however, of planting them, is from April to June.

“In the March following, the labourers carry a parcel of tubs and jars into the field, and each takes a slip or breadth of it, and begins by laying hold of a bunch of the blades, as much as he can conveniently grasp with one hand, while with the other he cuts it just above the surface of the earth, as quickly as possible (that the juice may not be wasted), and then places the blades in the tub, bunch by bunch, or handful by handful. When the first tub is thus packed quite full, a second is begun (each labourer having two); and by the time the second is filled, all the juice is generally drained out of the blades in the first tub. The blades are then lightly taken out, and thrown over the land by way of manure; and the juice is poured out into a jar. The tub is then filled again with blades, and so alternately till the labourer has produced his jar full, or about four gallons and an half of juice, which is often done in six or seven hours, and he has then the remainder of the day to himself, it being his employer's interest to get each day's operation as quickly done as possible.—It may be observed, that although aloes are often cut in nine, ten, or twelve months after being planted, they are not in perfection till the second and third year; and that they will be productive for a length of time, say 10 or 12 years, or even for a much longer time, if good dung, or manure of any kind, is strewed over the field once in three or four years, or oftener if convenient.

“The aloe juice will keep for several weeks without injury. It is therefore not boiled till a sufficient quantity is procured to make it an object for the boiling-house. In the large way, three boilers, either of iron or of copper, are placed to one fire, though some have but two, and the small planters only one. The boilers are filled with the juice; and as it ripens, or becomes more inspissated, by a constant but regular fire, it is ladled forward from boiler to boiler, and fresh juice is added to that farthest from the fire, till the juice in that nearest to the fire (by much the smallest of the three, and commonly called by the name of *tatch*, as in the manufactory of sugar) becomes of a proper consistency to be skipped or ladled out into gourds, or other small vessels, used for its final reception. The proper time to skip or ladle it out of the *tatch*, is when it is arrived at what is termed a resin height, or when it cuts freely, or in thin flakes, from the edges of a small wooden slice, that is dipped from time to time into the *tatch* for that purpose. A little lime-water is used by some aloe-boilers, during the process, when the ebullition is too great.

“Aa

* Vol. viii.
Art. 8.

Aloe.

"As to the sun-dried aloes (which is most approved for medicinal purposes), very little is made in Barbadoes. The process is, however, very simple, though extremely tedious. The raw juice is either put into bladders, left quite open at top, and suspended in the sun, or in broad shallow trays of wood, pewter, or tin, exposed also to the sun, every dry day, until all the fluid parts are exhaled, and a perfect resin formed, which is then packed up for use, or for exportation."

The Barbadoes aloes is said to be common also in the other West-India islands; and the following account of the manner of preparing it in Jamaica is given by Dr Wright in the same volume of the Medical Journal, art. 1. "The plant is pulled up by the roots, and carefully cleansed from the earth or other impurities. It is then sliced and cut in pieces, and put into small hand-baskets or nets. These nets or baskets are put into large iron boilers with water, and boiled for ten minutes, when they are taken out, and fresh parcels supplied till the liquor is strong and black. At this period the liquor is thrown through a strainer into a deep vat, narrow at bottom, to cool, and to deposit its feculent parts. Next day the clear liquor is drawn off by a cock, and again committed to the large iron vessel. At first it is boiled briskly; but towards the end of the evaporation is slow, and requires constantly stirring to prevent burning. When it becomes of the consistence of honey, it is poured into gourds or calabashes for sale. This hardens by age."

3. *ALOE-Caballina*, fetid, caballine, or horse-aloes, is supposed to be a coarser sort obtained from the same species with the foregoing; according to others, it is the produce of the disticha. It is chiefly distinguishable by its strong rank smell.

All the different kinds are gum-resins, which contain more gummy than resinous parts. Water, when of a boiling heat, dissolves all the soluble parts of aloes; but if let stand till it grows cold, it lets drop most of its resin. A strong spirit dissolves and keeps suspended almost the whole of aloes, though it contains such a large portion of gummy parts; hence it is evident, that aloes contains some principle, saline or other, which renders water capable of dissolving resin, and spirit capable of dissolving gum.

Aloes is a stimulating stomachic purge, which, given in small quantity, operates mildly by stool; but in large doses acts roughly, and often occasions an irritation about the anus, and sometimes a discharge of blood. It is a good opening medicine to people of a lax habit, or who live a sedentary life; and to those whose stomach and bowels are loaded with phlegm or mucus, or who are troubled with worms, or are debilitated; because at the same time that it carries off those viscid humours which pall the appetite, and overload the intestines, it serves as a strengthener and bracer. In small doses, repeated from time to time, it not only cleanses the *prima viæ*, but likewise tends to promote the menstrual discharge in women; and therefore it is frequently employed in chlorosis, or where the menstrua are obstructed. It is a good stomachic purge, and is given in all cases where such a one is wanted; but it is looked upon as a heating medicine, and not proper in bilious habits, or where there is much heat or fever; and its continued use is apt to bring on the piles.

It is given in substance from five grains to a scruple,

though formerly it used to be prescribed in doses of two or three times that quantity; but these large doses sometimes brought on troublesome symptoms. As it is a slow working purge, it is generally taken at bedtime, and it operates next day.

With regard to this, as well as all other resinous purges, it ought to be observed, that when they are given in substance without any mixture, they are apt to adhere to the coats of the intestines, and to occasion griping and uneasiness; for these reasons aloes is generally mixed with some saponaceous or resolvent body, to destroy its viscid tenacity, before it is given in substance. The substances which are most used for this purpose are, a small quantity of the fixt alkaline salts; soap; the yolk of an egg; and gummy vegetable extracts. Mr Barton alleges*, that by triturating aloes with a small quantity of alkaline salts, its tenacity was more effectually destroyed than by any other thing he tried: that Castile soap and the yolk of an egg answered best, next to it; that manna, sugar, and honey, were far inferior to them; and that gummy, or mucous vegetable extracts, such as the extracts of gentian, or of liquorice root, triturated with the aloes, in the proportion of one part of the extract to two of the aloes, and then made up into pills with a sufficient quantity of syrup, destroyed the viscidness of the aloes, and rendered its operation mild.

Socotorine aloes contains more gummy matter than the hepatic; and hence it is likewise found to purge more, and with greater irritation. The first sort therefore is most proper where a stimulus is required, as for promoting or exciting the menstrual flux; whilst the latter is better calculated to act as a common purge. For the aloetic preparations, see PHARMACY. Index.

ALOES-Wood. See *XYLO-Aloes*.

AMERICAN ALOE. See *AGAVE*.

ALOGIANS, in church-history, a sect of ancient heretics, who denied that Jesus Christ was the Logos, and consequently rejected the gospel of St John—The word is compounded of the privative *α*, and *λογος*, q. d. *without Logos* or *Word*.—Some ascribe the origin of the name, as well as of the sect of Alogians, to Theodore of Byzantium, by trade a currier; who having apostatized under the persecution of the emperor Severus, to defend himself against those who reproached him therewith, said, that it was not God he denied, but only man. Whence his followers were called in Greek *αλογοι*, because they rejected the Word. But others, with more probability, suppose the name to have been first given them by Epiphanius in the way of reproach. They made their appearance toward the close of the second century.

ALOGOTROPHIA, among physicians, a term signifying the unequal growth or nourishment of any part of the body, as in the rickets.

ALOOF, has frequently been mentioned as a sea-term; but whether justly or not, we shall not presume to determine. It is known in common discourse to imply *at a distance*; and the resemblance of the phrases *keep a loof*, and *keep a luff*, or *keep the luff*, in all probability gave rise to this conjecture. If it was really a sea-phrase originally, it seems to have referred to the dangers of a lee-shore, in which situation the pilot might naturally apply it in the sense commonly understood, viz. *keep all off*, or quite off: it is, however, never expressed in that

Aloe.

Aloof.

Treatise of the Manufacture of Drugs, 1747.

Alopece that manner by seamen now. See **LUFF**. It may not be improper to observe, that besides using this phrase in the same sense with us, the French ^{also} call the weather-side of a ship, and the weather-clue of a course, *le lof*.

ALOPECE, **ALOPECIA** (anc. geog.), an island placed by Ptolemy at the mouth of the Tanais, and called the island *Tanais*: now *l'Isle des Renards* (Baudrand). Also an island of the Bosphorus Cimmerius (Pliny); and another in the *Ægean* sea, over-against Smyrna.

ALOPECIA, a term used among physicians to denote a total falling off of the hair from certain parts, occasioned either by the defect of nutritious juice, or by its vicious quality corroding the roots of it, and leaving the skin rough and colourless.

The word is formed from *αλωπηξ*, *vulpes*, "a fox;" whose urine, it is said, will occasion baldness, or because it is a disease which is common to that creature. It is directed to wash the head every night at going to bed with a ley prepared by boiling the ashes of vine-branches in red wine. A powder made by reducing hermodactyls to fine flour, is also recommended for the same purpose.

In cases where the baldness is total, a quantity of the finest burdock roots are to be bruised in a marble mortar, and then boiled in white wine until there remains only as much as will cover them. This liquor, carefully strained off, is said to cure baldness, by washing the head every night with some of it warm. A ley made by boiling ashes of vine branches in common water, is also recommended with this intention. A fresh cut onion, rubbed on the part until it be red and itch, is likewise said to cure baldness.

A multitude of such remedies are every where to be found in the works of Valescus de Taranta, Rondeletius, Hollerius, Trincavellius, Celsus, Senertay, and other practical physicians. See also **BUXUS**.

ALOPECURUS, or **FOX-TAIL GRASS**, in botany: A genus of the triandria digynia class; and in the natural method ranking under the 4th order, *Gramina*. The characters are: The *calyx* is a single-flowered bivalve glume: The *corolla* is one-valved: The *stamina* consist of three capillary filaments; the antheræ bifurcated at both ends: The *pistillum* is a roundish germen; there are two styli; and the stigmata are simple: The *pericarpium* is a corolla cloathing the seed; and the seed is single and roundish. There are eight species viz. the *pratensis*, or meadow fox-tail grass; the *bulbosus*, or bulbous fox-tail grass; the *geniculatus*, or flote fox-tail grass; and the *myosuroides*, or field fox-tail grass; these four grow wild in Britain: the *agrestis*, the *monspeliensis*, the *panicus*, and the *hordeiformis*, are all natives of France and the southern parts of Europe, except the last, which is a native of India. See **GRASS**.

ALOPEX, in zoology, a species of the canis, with a strait tail and black tip. It is commonly called the *field fox*.

ALOSA, the shad, or mother of herrings, a species of the Clupea. See **CLUPEA**.

ALOST, a town in Flanders, belonging to the house of Austria, seated on the river Dender, in the midway between Brussels and Ghent. It has but one parish; but the church is collegiate, and has a provost,

a dean, and twelve canons. Here is a convent of Carmelites, another of capuchines, another of bare-footed Carmelites, three nunneries, an hospital, and a convent of Guillemins, in which is the tomb of Theodore Martin, who brought the art of printing out of Germany into the Low Countries. He was a friend of Erasmus, who wrote his Epitaph. E. Long. 4. 10. N. Lat. 49. 55.

ALPHA, the name of the first letter of the Greek alphabet, answering to our A.—As a numeral, it stands for one, or the first of any thing. It is particularly used, among ancient writers, to denote the chief or first man of his class or rank. In this sense, the word stands contradistinguished from *beta*, which denotes the second person. Plato was called the *Alpha* of the wits: Eratosthenes, keeper of the Alexandrian library, whom some called a Second Plato, is frequently named *Beta*.

ALPHA is also used to denote the beginning of any thing. In which sense it stands opposed to *omega*, which denotes the end. And these two letters were made the symbol of Christianity; and accordingly were engraven on the tombs of the ancient Christians, to distinguish them from those of idolaters. Moralez, a Spanish writer, imagined that this custom only commenced since the rise of Arianism; and that it was peculiar to the orthodox, who hereby made confession of the eternity of Christ: but there are tombs prior to the age of Constantine whereon the two letters were found, besides that the emperor just mentioned bore them on his labarum before Arius appeared.

ALPHABET, the natural or customary series of the several letters of a language (see **LANGUAGE** and **WRITING**). The word is formed from *alpha* and *beta*, the first and second letters of the Greek alphabet. The number of letters is different in the alphabets of different languages. The English alphabet contains 24 letters; to which if we add *j* and *v* consonant, the sum will be 26: the French contains 23; the Hebrew, Chaldee, Syriac, and Samaritan, 22 each; the Arabic 28; the Persian 31; the Turkish 33; the Georgian 36; the Coptic 32; the Muscovite 43; the Greek 24; the Latin 22; the Slavonic 27; the Dutch 26; the Spanish 27; the Italian 20; the Ethiopic and Tartarian, each 202, the Indians of Bengal 21; the Barabese 19. The Chinese have, properly speaking, no alphabet, except we call their whole language by that name; their letters are words, or rather hieroglyphics, amounting to about 80,000.

It has been a matter of considerable dispute whether the method of expressing our ideas by visible symbols called *letters*, be really a human invention; or whether we ought to attribute an art so exceedingly useful, to an immediate revelation from the Deity.—In favour of the latter opinion it has been urged,

I. The five books of Moses are universally acknowledged to be the most ancient compositions as well as the most early specimens of alphabetical writing we have. If, therefore, we suppose writing to be the result of human ingenuity, it must be different from all other arts, having been brought to perfection at once; as it seems impossible to make any real improvement on the Hebrew alphabet. It may indeed be replied, that alphabetical characters perhaps have existed many ages before the writings of Moses, though the more ancient specimens have perished. This, however, being a mere

Alpha,
Alphabet.

Arguments
for writing
being a di-
vine revela-
tion.

Alphabet. mere unsupported assertion, without any historical testimony to corroborate it, cannot be admitted as a proof. Again, setting aside the evidence to be derived from Scripture on this subject, the simplicity of manners predominant in the early ages, the small extent of the intellectual powers of mankind, and the little intercourse which nations had with one another, which would seem more particularly to render writing necessary, can scarce allow us to suppose that such a complex and curious contrivance as alphabetical writing could be invented by a race of men whose wants were so few, their advantages so circumscribed, and their ideas so limited.

2. If alphabetical writing were a mere human invention, it might be expected that different nations would have fallen upon the same expedient independent of each other during the compass of so many ages. But no such thing has taken place; and the writing of every people on earth may be referred to one common original. If this can be proved, the argument from successive derivation, without a single instance of independent discovery, must be allowed to amount to the very highest degree of probability in favour of our hypothesis, which will now rest on the evidence for or against this fact; and which may be summed up in the following manner.

Among the European nations we find none who can pretend any right to the discovery of letters. All of them derived the art from the Romans, excepting only the Turks, who had it from the Arabians. The Romans never laid claim to the discovery; but confessed that they derived their knowledge from the Greeks, and the latter owned that they had it from the Phœnicians; who, as well as their colonists the Carthaginians, spoke a dialect of the Hebrew scarcely varying from the original. The Coptic, or Egyptian, resembles the Greek in most of its characters, and is therefore to be referred to the same original. The Chaldee, Syriac, and latter Samaritan, are dialects of the Hebrew, without any considerable deviation, or many additional words. The Ethiopic differs more from the Hebrew, but less than the Arabic; yet these languages have all issued from the same stock, as the similarity of their formation, and the numberless words common to them, all sufficiently evince; and the Persian is very nearly allied to the Arabic. Alterations indeed would naturally be produced, in proportion to the civilization of the several nations, and their intercourse with others; which will account for the superior copiousness of some above the rest. It appears then, that all the languages in use amongst men that have been conveyed in alphabetical characters, have been the languages of people connected ultimately or immediately with the Hebrews, who have handed down the earliest specimens of writing to posterity; and we have therefore the greatest reason to believe, that their method of writing, as well as their language, was derived from the same source.

This proposition will be farther confirmed from considering the sameness of the artificial denominations of the letters in the Oriental, Greek, and Latin languages, accompanied also by a similar arrangement, as *alpha*, *beta*, &c. It may still be objected, however, that the characters employed by the ancients to discriminate their letters are entirely dissimilar. Why

should not one nation, it may be urged, adopt from the other the mode of expressing the art as well as the art itself? To what purpose did they take the trouble of inventing other characters? To this objection it may be replied, 1. From the instance of our own language we know what diversities may be introduced in this respect merely by length of time and an intercourse with neighbouring nations. And such an effect would be more likely to take place before the art of printing had contributed to establish an uniformity of character: For when every work was transcribed by the hand, we may easily imagine how many variations would arise from the fancy of the scribe, and the mode of writing so constantly different in individuals. 2. This diversity might sometimes arise from vanity. When an individual of another community had become acquainted with this wonderful art, he might endeavour to recommend himself as the inventor; and, to avoid detection, might invent other characters. 3. The characters of the alphabet might sometimes be accommodated as much as possible to the symbolical marks already in use amongst a particular people. These having acquired a high degree of sanctity by the use of many generations, would not be easily superseded without the aid of some such contrivance. 4. This is supported by the testimony of Herodotus; who informs us, that "those Phœnicians who came with Cadmus introduced many improvements among the Greeks, and alphabetical writing too, not known among them before that period. At first they used the Phœnician character; but in process of time, as the pronunciation altered, the standard of the letters was also changed. The Ionian Greeks inhabited at that time the parts adjacent to Phœnicia: who having received the art of alphabetical writing from the Phœnicians, used it, with an alteration of some few characters, and confessed ingenuously, that it was called Phœnician from the introducers of it." He tells us that he had himself seen the characters of Cadmus in a temple of Ismenian Apollo at Thebes in Bœotia, engraven upon tripods, and very much resembling the Ionian characters. 5. The old Samaritan is precisely the same as the Hebrew language; and the Samaritan Pentateuch does not vary by a single letter in twenty words from the Hebrew: but the characters are widely different: for the Jews adopted the Chaldaic letters during their captivity at Babylon, instead of the characters of their forefathers.

3. What we know of those nations who have continued for many centuries unconnected with the rest of the world, strongly militates against the hypothesis of the human invention of alphabetical writing. The experiment has been fairly made upon the ingenuity of mankind for a longer period than that which is supposed to have produced alphabetical writing by regular gradations; and this experiment determines pre-emptorily in their favour. The Chinese, a people famous for their discoveries and mechanical turn of genius, have made some advances towards the delineation of their ideas by arbitrary signs; but have nevertheless been unable to accomplish this exquisite device; and after so long a trial to no purpose, we may reasonably infer, that their mode of writing, which is growing more intricate and voluminous every day, would never terminate in so clear, so comparatively simple,

Alphabet. simple, an expedient as that of alphabetical characters. The Mexicans, too, had made some rude attempts of the same kind; but with less success than the Chinese. We know also, that hieroglyphics were in use among the Egyptians posterior to the practice of alphabetical writing by the Jews; but whether the epistolography, as it is called, of the former people, which was in vogue during the continuance of the hieroglyphics, might not possibly be another name for alphabetical writing, cannot be decided.

4. We shall consider the argument on which the commonly received supposition entirely depends: that is, the natural gradation through the several species of symbols acknowledged to have been in use with various people, terminating at last by an easy transition, in the detection of alphabetical characters. The strength of this argument will be best understood from the following representation.

"1. The first method of embodying ideas would be by drawing a representation of the objects themselves. The imperfection of this method is very obvious, both on account of its tediousness and its inability of going beyond external appearances to the abstract ideas of the mind.

"2. The next method would be somewhat more general, and would substitute two or three principal circumstances for the whole transaction. So two kings, for example, engaging each other with military weapons, might serve to convey the idea of a war between the two nations. This abbreviated method would be more expeditious than the former; but what it gained in conciseness would be lost in perspicuity. It is a description more compendious indeed, but still a description of outward objects alone, by drawing their resemblance. To this head may be referred the picture-writing of the Mexicans.

"3. The next advance would be to the use of symbols: the incorporation, as it were, of abstract and complex ideas in figures more or less generalized, in proportion to the improvement of it. Thus, in the earlier stages of this device, a circle might serve to express the sun, a semicircle the moon; which is only a contraction of the foregoing method. This symbol-writing in its advanced state would become more refined, but enigmatical and mysterious in proportion to its refinement. Hence it would become less fit for common use, and therefore more particularly appropriated to the mysteries of philosophy and religion. Thus, two feet standing upon water served to express an impossibility; a serpent denoted the oblique trajectories of the heavenly bodies; and the beetle, on account of some supposed properties of that insect, served to represent the sun. The Egyptian hieroglyphics were of this kind.

"4. This method being still too subtle and complicated for common use, the only plan to be pursued was a reduction of the first stage of the preceding method. Thus a dot, instead of a circle, might stand for the sun; and a similar abbreviation might be extended to all the symbols. On this scheme every object and idea would have its appropriated mark: these marks therefore would have a multiplicity proportionable to the works of nature and the operations of the mind. This method was likewise practised by the Egyptians; but has been carried to greater per-

Vol. I. Part II.

fection by the Chinese. The vocabulary of the latter Alphabet is therefore infinite, or at least capable of being extended to any imaginable length. But if we compare this tedious and awkward contrivance with the astonishing brevity and perspicuity of alphabetical writing, we must be persuaded that no two things can be more dissimilar; and that the transition from a scheme constantly enlarging itself, and growing daily more intricate, to the expression of every possible idea by the modified arrangement of four and twenty marks, is not so very easy and perceptible as some have imagined. Indeed this seems still to be rather an expression of things in a manner similar to the second stage of symbol-writing than the notification of ideas by arbitrary signs."

To all this we shall subjoin the following remarks, which seem to give additional force to the foregoing reasoning. ² Additional remarks in confirmation of these arguments.

"1. Pliny asserts the use of letters to have been eternal; which shows the antiquity of the practice to extend beyond the æra of authentic history.

"2. The cabalistical doctors of the Jews maintain, that alphabetical writing was one of the ten things which God created on the evening of the Sabbath.

"3. Most of the profane authors of antiquity ascribe the first use of alphabetical characters to the Egyptians; who, according to some, received them from Mercury; and, according to others, from their god Teuth.

"4. There is very little reason to suppose that even language itself is the effect of human ingenuity and invention."

Thus we have stated the arguments in favour of the revelation of alphabetical writing; which are answered, by those who take the contrary side, in the following manner. ³ Answers to the above arguments.

1. Moses nowhere says that the alphabet was a new thing in his time; nor does he give the least hint of his being the inventor of it. The first mention we find of *writing* is in the 17th chapter of Exodus; where Moses is commanded to *write in a book*; and which took place before the arrival of the Israelites at Sinai. This shows that writing did not commence with the delivery of the two tables of the law, as some have supposed. Neither are we to conclude that the invention had taken place only a short time before; for the *writing in a book* is commanded as a thing commonly understood, and with which Moses was well acquainted. It is plain, from the command to engrave the names of the twelve tribes of Israel upon stones *like the engravings of a signet*, that writing had been known and practised among them, as well as other nations, long before. We must also remember, that the people were commanded to write the law on their door-posts, &c. so that the art seems not only to have been known, but universally practised among them. But had writing been a new discovery in the time of Moses, he would probably have commemorated it as well as the other inventions of music, &c.: Nor is there any reason to suppose that God was the immediate revealer of the art; for Moses would never have omitted to record a circumstance of such importance, as the memory of it would have been one of the strongest barriers against idolatry.

3 Q

Again,

Alphabet.

Again, though several profane writers attribute the origin of letters to the gods, or to some divine person, yet this is no proof of its being actually revealed; but only that the original inventor was unknown. The learned bishop of Gloucester observes, that the ancients gave nothing to the gods of whose original they had any records; but where the memory of the invention was lost, as of seed-corn, wine, writing, civil society, &c. the gods seized the property, by that kind of right which gives strays to the lord of the manor.

As neither the sacred nor profane historians, therefore, have determined any thing concerning the invention of letters, we are at liberty to form what conjectures we think most plausible concerning the origin of them; and this, it is thought, might have taken place in the following manner.

" 1. Men, in their rude uncultivated state, would have neither leisure, inclination, nor inducement, to cultivate the powers of the mind to a degree sufficient for the formation of an alphabet: but when a people arrived at such a pitch of civilization as required them to represent the conceptions of the mind which have no corporeal forms, necessity would occasion further exertions, and urge them to find out a more expeditious manner of transacting their business than by picture-writing.

" 2. These exertions would take place whenever a nation began to improve in arts, manufactures, and commerce; and the greater genius such a nation had, the more improvements would be made in the notation of their language; whilst those people who had made less progress in civilization and science, would have a less perfect system of elementary characters; and perhaps advance no farther for many ages than the marks or characters of the Chinese. Hence we may see, that the business of princes, as well as the manufactures and commerce of each country, would produce the necessity of devising some expeditious manner of communicating information to one another."

The art of writing, however, is of so great antiquity, and the early history of most nations so full of fable, that it must be extremely difficult to determine what nation or people may justly claim the honour of the invention. But as it is probable that letters were the produce of a certain degree of civilization among mankind, we must therefore have recourse to the history of those nations who seem to have been first civilized.

4
Claim of
the Egyptians
to the
invention
of letters.

The Egyptians have an undoubted title to a very early civilization; and many learned men have attributed the invention of letters to them. The late bishop of Gloucester contends, that Egypt was the parent of all the learning of Greece, and was resorted to all by the Grecian legislators, naturalists, and philosophers; and endeavours to prove that it was one of the first civilized countries on the globe. Their writing was of four kinds: 1. *Hieroglyphic*; 2. *Symbolic*; 3. *Epistolical*; and, 4. *Hierogrammatic*. In the most early ages they wrote like all other infant nations, by pictures; of which some traces yet remain amongst the hieroglyphics of Horapollon, who informs us, that they represented a *fuller* by a man's too feet in water; *fire*, by smoke ascending, &c. But to render this rude invention less inconvenient, they soon devised the method of putting one thing of similar qualities for another.

The former was called the *curiologic*, the latter the *Alphabet tropheal* hieroglyphic; which last was a gradual improvement on the former. These alterations in the manner of delineating hieroglyphic figures produced and perfected another character, called the *running-hand of the hieroglyphics*, resembling the Chinese writing; which having been first formed by the outlines of each figure; became at length a kind of *marks*; the natural effects of which were, that the constant use of them would take off the attention from the symbol and fix it on the thing signified. Thus the study of symbolic writing would be much abbreviated; because the writer or decypherer would have then little to do but to remember the power of the symbolic mark; whereas before, the properties of the thing or animal delineated were to be learned. This, together with the other marks by institution, to denote mental conceptions, would reduce the characters to a similar state with the present Chinese; and these were properly what the ancients called *hieroglyphical*. We are informed by Dr Robert Huntington, in his account of the Porphyry pillars, that there are some ancient monuments of this kind yet remaining in Egypt.

The sacred book or ritual of the Egyptians, according to Apuleius, was written partly in symbolic and partly in these hieroglyphic characters, in the following manner: "He (the hierophant) drew out certain books from the secret repositories of the sanctuary, written in unknown characters, which contained the words of the sacred formula compendiously expressed, partly by figures of animals, and partly by certain marks or notes intricately knotted, revolving in the manner of a wheel, crowded together, and curled inward like the tendrils of a vine, so as to hide the meaning from the curiosity of the profane."

But though letters were of great antiquity in Egypt, there is reason to believe that they were not first invented in that country. Mr Jackson, in his *Chronological Antiquities*, has endeavoured to prove, that they were not invented or carried into Egypt by *Taaud* or *Thoth*, the first Hermes, and son of *Misraim*, who lived about 500 years after the deluge; but that they were introduced into that country by the second Hermes, who lived about 400 years after the former. This second Hermes, according to Diodorus, was the inventor of grammar and music, and added many words to the Egyptian language. According to the same author also, he invented letters, rhythm, and the harmony of sounds. This was the Hermes so much celebrated by the Greeks, who knew no other than himself. On the other hand, Mr Wise asserts that Moses and Cadmus could not learn the alphabet in Egypt; and that the Egyptians had no alphabet in their time. He adduces several reasons to prove that they had none till they received what is called the *Coptic*, which was introduced either in the time of the Ptolemies or under Psammitichus or Amasis; and the oldest alphabetic letters which can be produced as Egyptian, appear plainly to have been derived from the Greek. Herodotus confesses, that all he relates before the reign of Psammitichus is uncertain; and that he reports the early transactions of that nation on the credit of the Egyptian priests, on which he did not greatly depend; and Diodorus Siculus is said to have been greatly imposed upon by them. Manetho, the oldest Egyptian historian, translated

5
Letters not
invented in
Egypt.

^{Alphabet.} translated the sacred registers out of Egyptian into Greek, which are said by Syncellus to have been written in the sacred letters, and to have been laid up by the second Mercury in the Egyptian temples. He allows the Egyptian gods to have been mortal men; but his history was very much corrupted by the Greeks, and hath been called in question by several writers from the account which he himself gave of it. After Cambyfes had carried away the Egyptian records, the priests, to supply their loss, and to keep up their pretensions to antiquity, began to write new records; wherein they not only unavoidably made great mistakes, but added much of their own invention, especially as to distant times.

⁶
Claim of
the Phœni-
cians.

The Phœnicians have likewise been supposed the inventors of letters; and we have the strongest proofs of the early civilization of this people. Their most ancient historian, Sanchoniatho, lived in the time of Abibalus, father of Hiram king of Tyre. He informs us, that letters were invented by *Taaut*, who lived in Phœnicia in the 12th and 13th generations after the creation. "Misor (says he) was the son of Hamyn; the son of Misor was *Taaut*, who invented the first letters for writing." The Egyptians call him *Thoth*; the Alexandrians *Thoyth*; and the Greeks *Hermes*, or *Mercury*. In the time of this *Taaut* or Mercury (the grandson of Ham the son of Noah), Phœnicia and the adjacent country was governed by Uranus, and after him by his son Saturn or Cronus. He invented letters either in the reign of Uranus or Cronus; and staid in Phœnicia with Cronus till the 32d year of his reign. Cronus, after the death of his father Uranus, made several settlements of his family, and travelled into other parts; and when he came to the south country, he gave all Egypt to the god *Taautus*, that it should be his kingdom. Sanchoniatho began his history with the creation, and ended it with placing *Taautus* on the throne of Egypt. He does not mention the deluge, but makes too more generations in Cain's line from Protagonus to Agrovenus (or from Adam to Noah) than Moses. As Sanchoniatho has not told us whether *Taaut* invented letters either in the reign of Uranus or Cronus, "we cannot err much (says Mr Jackson) if we place his invention of them 550 years after the flood, or 20 years after the dispersion, and 2619 years before the Christian æra, and six, or perhaps ten years, before he went into Egypt." This prince and his posterity reigned at Thebes in Upper Egypt for 15 generations.

Several Roman authors attribute the invention of letters to the Phœnicians. Pliny says (A), the Phœnicians were famed for the invention of letters, as well as for astronomical observations and novel and martial arts. Curtius informs us, that the Tyrian nation are related to be the first who either taught or learned letters; and Lucan says, that they were the first who attempted to express sounds or words by letters. Eusebius also tells us from Porphyry, that "Sanchoniatho studied with great application the writings of *Taaut*, knowing that he was the first who invented letters."

The Greeks, as we have already observed, knew no ^{Alphabet.} older Hermes than the second, who lived about 400 years after the Mezrite *Taaut* or Hermes. This second Hermes is called by Plato *Theuth*, and counsellor or sacred scribe to king Thanius; but it is not said that he ever reigned in Egypt: but the former *Taaut*, or Athothes, as Monetho calls him, was the immediate successor of Menes the first king of Egypt. This second Mercury, if we may believe Manetho, composed several books of the Egyptian history; and having improved both the language and letters of that nation, the Egyptians attributed the arts and inventions of the former to the latter. The Phœnician language is generally allowed to have been a dialect of the Hebrew; and tho' their alphabet does not entirely agree with the Samaritan, yet there is a great similarity between them. Astronomy and arithmetic were much cultivated among them in the most early ages; their fine linen, purple, and glass, were much superior to those of other nations; and their extraordinary skill in architecture and other arts was such, that whatever was great, elegant, or pleasing, whether in buildings, apparel, or toys, was distinguished by the epithet of Tyrian or Sidonian; these being the chief cities of Phœnicia. Their great proficiency in learning and arts of all kinds, together with their engrossing all the commerce of the western world, are likewise thought to give them a just claim to the invention of letters.

⁷
The Chaldeans also have laid claim to the invention of the letters; and with regard to this, there is a tradition of the Chaldeans. among the Jews, Indians, and Arabians, that the Egyptians derived their knowledge from Abraham, who was a Chaldean. This tradition is in some degree confirmed by most of the western writers, who ascribe the inventions of arithmetic and astronomy to the Chaldeans. Josephus positively asserts, that the Egyptians were ignorant of the sciences of arithmetic and astronomy before they were instructed by Abraham; and Sir Isaac Newton admits, that letters were known in the line of that patriarch for many centuries before Moses. The Chaldaic letters appear to have been derived from the Hebrew or Samaritan; which are the same, or nearly so, with the old Phœnician. Ezra is supposed to have exchanged the old Hebrew characters for the more beautiful and commodious Chaldee, which are still in use. Berosus, the most ancient Chaldean historian, who was born in the minority of Alexander the Great, does not say that he believed his countrymen to have been the inventors of letters.

⁸
The Syrians have also laid claim to the invention of the letters. It is certain, indeed, that they yielded to the Syrians. no nation in knowledge and skill in the fine arts. Their language is said to have been the vernacular of all the oriental tongues, and was divided into three dialects. 1. The Aramean, used in Mesopotamia, and by the inhabitants of Roha and Edefa of Harram, and the Outer Syria. 2. The dialect of Palestine; spoken by the inhabitants of Damascus, Mount Libanus, and the Inner Syria. 3. The Chaldee or Nabathean dialect, the most unpolished of the three; and spoken in the mountainous parts of Assyria, and the villages of

3 Q²

Irac

(A) See above, n° 2. where he says that the knowledge of letters was eternal. What dependence can we put in the testimony of such a writer?

Alphabet. Irac or Babylonia. It has been generally believed, that no nation of equal antiquity had a more considerable trade than the Syrians: they are supposed to have first brought the commodities of Persia and India into the west of Asia; and they seem to have carried on an inland trade by engrossing the navigation of the Euphrates, whilst the Phœnicians traded to the most distant countries. Notwithstanding these circumstances, however, which might seem to favour the claim of the Syrians, the oldest characters they have are but about three centuries before Christ. — Their letters are of two sorts. 1. The Estrangelo, which is the more ancient; and, 2. The Fshito, the simple or common character, which is the more expeditious and beautiful.

9.
Of the In-
dians.

We must next examine the claims of the Indians, whose pretensions to antiquity yield to no other nation on earth. Mr Halhed, who has written a grammar of the Shanscrit language, informs us, that it is not only the grand source of Indian literature, but the parent of almost every dialect from the Persian gulph to the Chinese seas, and which is said to be a language of the most venerable antiquity. At present it is appropriated to religious records of the Bramins, and therefore shut up in their libraries; but formerly it appears to have been current over the greatest part of the eastern world, as traces of its extent may be found in almost every district of Asia.

Mr Halhed informs us, that “there is a great similarity between the Shanscrit words and those of the Persian and Arabic, and even of Latin and Greek; and these not in technical or metaphorical terms, but in the main ground-works of language; in monosyllables, the names of numbers, and the appellations of such things as would be first discriminated on the immediate dawn of civilization. The resemblance which may be seen of the characters on the medals and signets of different parts of Asia, the light they reciprocally throw upon one another, and the general analogy which they all bear to the grand prototype, affords another ample field for curiosity. The coins of Assam, Nappaul, Cashmiria, and many other kingdoms, are all stamped with Shanscrit letters, and mostly contain allusions to the old Shanscrit mythology. The same conformity may be observed in the impressions of seals from Bootan and Thibet.”

The country between the Indus and Ganges still preserves the Shanscrit language in its original purity, and offers a great number of books to the perusal of the curious; many of which have been handed down from the earliest periods of human civilization.

There are seven different sorts of Indian hand-writings, all comprised under the general term of *Naagoree*, which may be interpreted *writing*. The Bramins say that letters were of divine original; and the elegant Shanscrit is styled *Daeb-naagoree*, or the writings of the Immortals, which might not improbably be a refinement from the more simple *Naagoree* of former ages. The Bengal letters are another branch of the same stock. The Bramins of Bengal have all their Shanscrit books copied in their national alphabet, and they transpose into them all the *Daeb-naagoree* manuscripts for their own perusal. The Moorish dialect is that species of Hindostanic which we owe to the conquests of the Mahometans.

The Shanscrit language contains about 700 radical

words; the fundamental part being divided into three Alphabet. classes, viz. 1. *Dhaat*, or roots of verbs; 2. *Shubd*, or original nouns; 3. *Evya*, or particles. Their alphabet contains 50 letters; viz. 34 consonants and 16 vowels. They assert that they were in possession of letters before any other nation in the world; and Mr Halhed conjectures, that the long-boasted original civilization of the Egyptians may still be a matter of dispute. The Rajah of Kishinagur affirms, that he has in his possession Shanscrit books, where the Egyptians are constantly described as disciples, not as instructors; and as seeking in Hindostan that liberal education, and those sciences, which none of their own countrymen had sufficient knowledge to impart. Mr Halhed hints also, that the learning of Hindostan might have been transplanted into Egypt, and thus have become familiar to Moses. Several authors, however, are of opinion, that the ancient Egyptians possessed themselves of the trade of the East by the Red Sea, and that they carried on a considerable traffic with the Indian nations before the time of Sesostris; whom they suppose to have been cotemporary with Abraham, though Sir Isaac Newton conjectures him to have been the Shishak who took Jerusalem in the time of Rehoboam.

In the year 1769, one of the sacred books of the Gentoos called *Bagavadam*, translated by Meridas Poule, a learned man of Indian origin, and chief interpreter to the supreme council of Pondicherry, was sent by him to M. Bertin in France. In his preface he says, that it was composed by Viasser the son of Brahma, and is of sacred authority among the worshippers of Vishnow. This book claims an antiquity of 5000 years; but M. de Guines has shown, that its pretensions to such extravagant antiquity are entirely inconclusive and unsatisfactory: whence we may conclude, says Mr Astle, that though a farther inquiry into the literature of the Indian nations may be laudable, yet we must by no means give too easy credit to their relations concerning the high antiquity of their manuscripts and early civilization.

It is not pretended that the Persians had any great learning among them till the time of Hytaspes the father of Darius. The former, we are told, travelled into India, and was instructed by the Bramins in the sciences for which they were famed at that time. The ancient Persians despised riches and commerce, nor had they any money among them till after the conquest of Lydia. It appears by several inscriptions taken from the ruins of the palace of Persepolis, which was built near 700 years before the Christian æra, that the Persians sometimes wrote in perpendicular columns like the Chinese. This mode of writing was first made use of on the stems of trees, pillars, or obelisks. As for those simple characters found on the west side of the stair-case of Persepolis, some have supposed them to be alphabetic, some hieroglyphic, and others antediluvian. Dr Hyde pronounces them to have been mere whimsical ornaments, though the author of *Conjectural Observations on Alphabetic Writing* supposes them to be fragments of Egyptian antiquity brought by Cambyes from the spoils of Thebes. The learned are generally agreed, that the Persians were later in civilization than many of their neighbours; and they are not supposed to have any pretensions to the invention of letters.

As the Arabians have been in possession of the country

Alphabet. try they now inhabit for upwards of 3700 years, without being intermixed with foreign nations, or subjugated by any other power, their language must be very ancient. The two principal dialects of it were that spoken by the Hamyarites and other genuine Arabs; and that of the Koreish, in which Mahomet wrote the Alcoran. The former is named by oriental writers *the Arabic of Hamyar*; the latter, *the pure or defecated Arabic*. Mr Richardson observes, as a proof of the richness of this language, that it consists of 2000 radical words.

11
Nor by the
Arabians.

The old Arabic characters are said to have been of very high antiquity; for Ebn Hashem relates, that an inscription in it was found in Yaman as old as the days of Joseph. Hence some have supposed that the Arabians were the inventors of letters; and Sir Isaac Newton is of opinion, that Moses learned the alphabet from the Midianites, who were Arabians.

The Alphabet of the Arabs consists of 28 letters similar to the ancient Cufic, in which the first copies of the Alcoran were written. The present Arabic characters were formed by Ebn Moklah, a learned Arabian, who lived about 300 years after Mahomet. The Arabian writers themselves inform us, that their alphabet is not very ancient, and that they received it only a short time before the introduction of Islamism.

On this account of the pretensions of different nations to the invention of letters, Mr Asple makes the following reflections: "The vanity of each nation induces them to pretend to the most early civilization; but such is the uncertainty of ancient history, that it is difficult to determine to whom the honour is due. It should seem, however, that the contest may be confined to the Egyptians, the Phœnicians, and the Chaldeans. The Greek writers, and most of those who have copied them, decide in favour of Egypt, because their information is derived from the Egyptians themselves. The positive claim of the Phœnicians does not depend entirely upon the testimony of Sanchoniatho; the credit of his history is so well supported by Philo of Byblus, his translator, Porphyry, Pliny, Curtius, Lucan, and other ancient writers, who might have seen his works entire, and whose relations deserve at least as much credit as those of the Egyptian and Greek writers. It must be allowed, that Sanchoniatho's history contains many fabulous accounts; but does not the ancient history of the Egyptians, the Greeks, and most other nations, abound with them to a much greater degree? The fragments which we have of this most ancient historian are chiefly furnished by Eusebius, who took all possible advantages to represent the Pagan writers in the worst light, and to render their theology absurd and ridiculous.

"The Phœnician and Egyptian languages are very similar; but the latter is said to be more large and full, which is an indication of its being of a later date. The opinion of Mr Wise, however, that the ancient Egyptians had not the knowledge of letters, seems to be erroneous; as they had commercial intercourse with their neighbours the Phœnicians, they probably had the knowledge of letters, if their policy, like that of the Chinese at this day, did not prohibit the use of them.

"The Chaldeans, who cultivated astronomy in the most remote ages, used symbols or arbitrary marks in

their calculations; and we have shown, that these were the parents of letters. This circumstance greatly favours their claim to the invention; because Chaldea, and the countries adjacent, are allowed by all authors, both sacred and profane, to have been peopled before Egypt; and it is certain that many nations said to be descended from Shem and Japhet, had their letters from the Phœnicians, who were descended from Ham.

Alphabet.

"It is observable, that the Chaldeans, the Syrians, Phœnicians, and Egyptians, all bordered upon each other; and as the Phœnicians were the greatest as well as the most ancient commercial nation, it is very probable that they communicated letters to the Egyptians, the ports of Tyre and Sidon being not far distant from each other.

"Mr Jackson is evidently mistaken when he says, that letters were invented 2619 years before the birth of Christ. The deluge recorded by Moses was 2349 years before that event; and if letters were not invented till 550 years after, as he asserts, we must date their discovery only 1799 years before the Christian æra, which is 410 years after the reign of Menes, the first king of Egypt, who, according to Syncellus and others, is said to have been the same person with the Misor of Sanchoniatho, the Mizraim of the Scriptures, and the Osiris of the Egyptians; but whether this be true or not, Egypt is frequently called in Scripture *the land of Mizraim*.

"This Mizraim, the second son of Amyn or Ham, seated himself near the entrance of Egypt at Zoan, in the year before Christ 2188, and 160 years after the flood. He afterwards built Thebes, and some say Memphis. Before the time that he went into Egypt, his son Taaut had invented letters in Phœnicia; and if this invention took place ten years before the migration of his father into Egypt, as Mr Jackson supposes, we may trace letters as far back as the year 2178 before Christ, or 150 years after the deluge recorded by Moses: and beyond this period, the written annals of mankind, which have been hitherto transmitted to us, will not enable us to trace the knowledge of them; though this want of materials is no proof that letters were not known until a century and an half after the deluge. As for the pretensions of the Indian nations, we must be better acquainted with their records before we can admit of their claim to the first use of letters; especially as none of their manuscripts of any great antiquity have as yet appeared in Europe. That the Arabians were not the inventors of letters, has appeared by their own confession.—Plato somewhere mentions Hyperborean letters very different from the Greek; these might have been the characters used by the Tartars or ancient Scythians.

"It may be expected that something should be said concerning those books mentioned by some authors to have been written before the deluge. Amongst others, Dr Parsons, in his *Remains of Japhet*, p. 346. 359. supposes letters to have been known to Adam; and the Sabeans produce a book which they pretend was written by Adam. But concerning these we have no guide to direct us any more than concerning the supposed books of Enoch; some of which, Origin tells us, were found in Arabia Felix, in the dominion of the queen of Saba. Tertullian affirms, that he saw

13

Of Antediluvian writing.

and

12
Letters
most probably
invented in
Phœnicia.

Alphabet. and read several pages of them; and in his treatise *De Habitu Mulierum*, he places those books among the canonical: but St Jerom and St Austin look upon them to be apocryphal. William Postellus pretended to compile his book *De Originibus* from the book of Enoch; and Thomas Bangius published at Copenhagen, in 1657, a work which contains many singular relations concerning the manner of writing among the Antediluvians, which contains several pleasant stories concerning the books of Enoch.

"With regard to this patriarch, indeed, St Jude informs us, that he *prophefied*, but he does not say that he *wrote*. The writings, therefore, attributed to the Antediluvians, must appear quite uncertain; though it might be improper to assert that letters were unknown before the deluge recorded by Moses."

14
All the alphabets in the world cannot be proved to arise from one original.

Our author proceeds to show, that all the alphabets in the world cannot be derived from one original; because there are a variety of alphabets used in different parts of Asia, which vary in name, number, figure, order, and power, from the Phœnician, ancient Hebrew, or Samaritan. In several of these alphabets also, there are marks for sounds peculiar to the language of the east, which are not necessary to be employed in the notation of the languages of Europe.

None of the alphabets to the east of Persia have any connection with the Phœnician or its derivatives, except where the Arabic letters have been introduced by the conquests of the Mahometans. The foundation of all the Indian characters are those called *Shanscrit*, or *sungskrit*. This signifies something brought to perfection, in contradistinction to *prakrit*, which signifies vulgar or unpolished. Hence the refined and religious language and characters of India are called *Sungskrit*, and the more vulgar mode of writing and expression *Prakrit*. From this Shanscrit are derived the sacred characters of Thibet, the Cashmirian, Bengalese, Malabaric, and Tamoul; the Singalese, Siamese, Maharattan, Concanee, &c. From the same source we may derive the Tangutic or Tartar characters, which are similar, in their great outlines, to the Shanscrit; though it is not easily determined which is derived from the other. The common Tartar is generally read, like the Chinese, from top to bottom.

There are, however, several alphabets used in different parts of Asia, entirely different not only from the Shanscrit and all those derived from it, but also from the Phœnician and those which proceed from it. Some of these are the alphabet of Pegu, the *Batta* characters used in the island of Sumatra, and the *Barman* or *Boman* characters used in some parts of Pegu. The names and powers of the letters of which these alphabets are composed, differ entirely from the Phœnician, or those derived from them. It is impossible to assimilate their forms, and indeed it is by no means easy to conceive how the 50 letters of the Shanscrit language could be derived from the Phœnician alphabet, which consisted originally only of 13; though it is certain, that by far the greater number of alphabets now in use are derived from the ancient Hebrew, Phœnician, or Samaritan.

Mr Astle next proceeds to consider what alphabets are derived from the Phœnician. These he supposes to have been immediately the ancient Hebrew or Samaritan; the Chaldaic; the Bastulian (A) or Spanish Phœnician; the Punic, Carthaginian, or Sicilian; and the Pelasgian. From the ancient Hebrew proceeded the Chaldaic or square Hebrew; the round Hebrew; and what is called the *running hand of the Rabbins*. The Pelasgian gave birth to the Etruscan, Eugubian, or Umbrian, Oscan, Samnite, and Ionic Greek, written from the left. From the Chaldaic or square Hebrew are derived the Syriac, and the ancient and modern Arabic. The Syriac is divided into the Estrangelo and Mendæan, and the modern Arabic has given rise to the Persian and Turkish. From the ancient Arabic are derived the Kufic or Oriental, the Mauritanic or Occidental; the African or Saracen, and the Moorish. The Ionic Greek gave rise to the Arcadian, Latin, ancient Gaulish, ancient Spanish, ancient Gothic, Coptic, Ethiopic, Russian, Illyrian or Slavonic, Bulgarian and Armenian. From the Roman are derived the Lombardic, Visigothic, Saxon, Gallican, Franco-Gallic or Merovingian, German, Caroline, Capetian, and modern Gothic.

The Punic letters are also called *Tyrian*, and were much the same with the Carthaginian or Sicilian. The Punic language was at first the same with the Phœnician; it is nearly allied to the Hebrew, and has an affinity with the Chaldee and Syriac. Some remains of it are to be met with in the Maltese. To make a complete Punic, Carthaginian, or Sicilian alphabet, we must admit several pure Phœnician letters.

The Pelasgi were likewise of Phœnician original; and, according to Sanchoniatho, the Dioscuri and Cabiri wrote the first annals of the Phœnician history, by order of Taaut the inventor of letters. They made ships of burthen, and being cast upon the coast near mount Casius, about 40 miles from Pelusium, where they built a temple in the second generation after the deluge related by Moses, they were called *Pelasgi*, from their passing by sea, and wandering from one country to another. Herodotus informs us, that the Pelasgi were descendants of the Phœnician Cabiri, and that the Samothracians received and practised the Cabiric mysteries from them. The Pelasgic alphabet prevailed in Greece till the time of Deucalion, when the Pelasgi were driven out of Thessaly or Oenotria by the Hellenes; after which some of them settled at the mouth of the Po, and others at Croton, now *Cartona* in Tuscany. Their alphabet consisted of 16 letters, and the Tyrrhenian alphabet, brought into Italy before the reign of that prince, consisted of no more than 13. Deucalion is said to have reigned about 820 years after the deluge, and 1529 before the Christian æra.

That the Tyrrheni, Tyrseni, or Etrusci, settled in Italy long before this period, appears from the testimony of Herodotus, who informs us, that a colony went by sea from Lydia into Italy under Tyrrhenus; and Dionysius of Halicarnassus proves that many authors called them Pelasgi. He then cites Hellanicus Lesbicus, an author somewhat more ancient than Herodotus,

(A) The Bastuli are said to have been a Canaanitish or Phœnician people who fled from Joshua, and settled afterwards in Spain.

Alphabet. rodotus, to prove, that they were first called *Pelasgi Tyrrheni*; and when they passed into Italy, they settled in that part of it called *Etruria*. Their emigration took place about the year of the world 2011, or 1993 years before the Christian æra, which is 350 years before the Pelasgi left Greece. Bishop Cumberland adduces many proofs to show that the Tyrrhenians originally came out of Lydia into Italy. Several Roman authors also speak of this Lydian colony; and Horace compliments his patron Mæcenas upon his Lydian descent:

*Lydorum quicquid Etruscos
Incoluit fines, nemo generosior est te.*

The Etruscan letters are Pelasgic, and several of the Etruscan inscriptions are written in the Pelasgic language. The Roman letters are Ionic. The Oscan language was a dialect of the Etruscan; their characters are nearer the Ionic or Roman than the Etruscan. There is also very little difference between the Pelasgian, Etruscan, and most ancient Greek letters, which are placed from right to left. The Arcadians were ancient Greeks, and used the Ionic letters; but at what time they began to write from left to right is not known, as their chronology is very uncertain. The Etruscan, Oscan, and Samnite alphabets, are derived from the Pelasgic; they differ from each other more in name than in form; but a far greater number are derived from the Ionic Greek, namely, the Arcadian, the Latin or Roman, and the others already enumerated. The Runic is immediately derived from the Gothic.

According to Dionysius of Halicarnassus, the first Greek colony which came into Italy consisted of Arcadians, under the conduct of Oenotrus, the son of Lycaon, and fifth in descent from Phoroneus, the first king of Argos, who reigned about 566 years before the taking of Troy, and 1750 years before the Christian æra. These Oenotrians were called *Aborigines*; and after they had been engaged for many years in a war with the Siculi, entered into an alliance with a colony of the Pelasgi, who came out of Thessaly into Italy, after having been driven from the former country.—About 1476 B. C. another colony of the Pelasgi, who had been driven out of Thessaly by the Curetes and Leleges, arrived in Italy, where they assisted the Aborigines to drive out the Siculi; possessing themselves of the greatest part of the country between the Tiber and the Liris, and building several cities. Solinus and Pliny tell us, that the Pelasgi first carried letters into Italy; and the latter distinguishes between the Pelasgi and the Arcades: so the letters first carried into Italy were not the Ionic Greek, but those more ancient Pelasgic characters which the Pelasgi carried with them before Deucalion and Cadmus are said to have come into Bœotia and Thessaly. The story of Cadmus is much involved in fable; but it is agreed by most of the ancients, that the children of Agenor, viz. Cadmus, Europa, Phoenix, and Cilix, carried with them a colony, composed of Phœnicians and Syrians, into Asia Minor, Crete, Greece, and Lybia, where they introduced letters, music, poetry, and other arts, sciences, and customs, of the Phœnicians.

Dionysius enumerates the following Greek colonies which came into Italy: 1. The Aborigines under Oenotrus, from Arcadia. 2. The Pelasgic colony, which came from Hæmonia or Thessaly. 3. Another Arca-

dian colony, which came with Evander from Palantium. Alphabet. 4. Those who came from Peloponnesus with Hercules; and, 5. Those who came with Æneas from Troy. It is not easy to discover when the Ionic way of writing from left to right was introduced into Italy; but it is certain, that it did not universally prevail even in Greece till several ages after it was found out. The Athenians did not comply with it till the year of Rome 350; nor was it practised by the Samnites even in the sixth century of that city, or 230 years before Christ: for M. Gæbelin, vol. VI. pl. 2. gives us the Samnite alphabet of that century, wherein the letters are placed from right to left; although the Ionic way of writing prevailed in some parts of Italy in the third century of Rome. "In time (says Pliny) the tacit consent of all nations agreed to use the Ionic letters. The Romans consented to this mode about the time of Tarquinius Priscus, their fifth king." The letters brought by Damaratus the Corinthian, the father of Tarquin, Mr Wise thinks, must have been the new or Ionic alphabet, and not the same with that brought by Evander 500 years before. After the Romans had established the use of the Ionic letters, they seem not to have acknowledged the Pelasgian and Etruscan to have been Greek alphabets: the most learned of them knew none older than the Ionic, as appears from the Greek Farnese inscriptions of Herodes Atticus. This learned man, out of a regard to antiquity, caused the oldest orthography to be observed in the writing, and the letters to be delineated after the most antique forms that could be found; and they are plainly no other than the Ionic or right-handed characters.

The ancient Gaulish letters are derived from the See Plates Greek, and their writing approaches more nearly to IX. and X. the Gothic than that of the Romans: this appears by for speci- the monumental inscription of Gordian, messenger of mens of the the Gauls, who suffered martyrdom in the third cen- ancient al- tury, with all his family. These ancient Gaulish cha- phabets here enu- racters were generally used by that people before the merated. conquest of Gaul by Cæsar; but after that time the Roman letters were gradually introduced. The ancient Spaniards used letters nearly Greek before their intercourse with the Romans. The ancient Gothic alphabet was very similar to the Greek, and is attributed to Ulphilas, bishop of the Goths, who lived in Mesia about 370 years after Christ. He translated the Bible into the Gothic tongue. This circumstance might have occasioned the tradition of his having invented these letters; but it is probable that these characters were in use long before this time. The Runic alphabet is derived from the ancient Gothic.

The Coptic letters are derived immediately from the Greek. Some have confounded them with the ancient Egyptian; but there is a very material difference between them. The Ethiopic alphabet is derived from the Coptic.

The alphabet proceeding from that of the Scythians established in Europe, is the same with what St Cyril calls the *Servien*. The Russian, Illyrian, or Sclavonic, and the Bulgarian, are all derived from the Greek. The Armenian letters differ very much from the Greek, from which they are derived, as well as from the Latin.

With regard to the alphabets derived from the La- Alphabets tin, the Lombardic relates to the manuscripts of Italy, derived from the the Latin.

Alphabet. the Visigothic to those of Spain; the Saxon to those of England; the Gallican and Franco-Gallic or Merovingian to the manuscripts of France; the German to those of that country; and the Caroline, Copetian, and Modern Gothic, to all the countries of Europe who read Latin. The first six of these alphabets are before the age of Charlemagne, the last three posterior to it. They are more distinguished by their names than the forms of their characters; and the former indicate all of them to have been of Roman extraction. Each nation, in adopting the letters of the Romans, added thereto a taste and manner peculiar to itself, which obviously distinguished it from the writings of all other people; whence arose the differences between the writings of the Lombards, Spaniards, French, Saxons, Germans, and Goths, and all the strange terms observable in the writings of the Francic Gauls or Merovingians; and those of the Carlovingians, their successors, may be traced from the same source. From these distinctions the name of *national writing* was derived.

The writing of Italy was uniform till the irruption of the Goths, who disfigured it by their barbarous taste. In 569, the Lombards, having possessed themselves of all Italy, excepting Rome and Ravenna, introduced that form of writing which goes under their name; and as the Popes used the Lombardic manner in their bulls, the name of *Roman* was sometimes given to it in the 11th century; and though the dominion of the Lombards continued no longer than 206 years, the name of their writing continued in Italy from the 7th to the 13th century, and then ceased; when learning, having declined in that as well as in other countries, the manner of writing degenerated into the modern Gothic.

The Visigoths introduced their form of writing into Spain, after having over-run that country; but it was abolished in a provincial synod, held at Leon in 1091, when the Latin characters were established for all public instruments, though the Visigothic were used in private writings for three centuries afterwards.

The Gauls, on being subjected by the Romans, adopted their manner of writing; but by subsequent additions of their own, their characters were changed into what is called the Gallican or *Roman Gallic* mode. This was changed by the Franks into the *Franco-Gallic* or *Merovingian* mode of writing, being practised under the kings of the Merovingian race. It took place towards the close of the sixth century, and continued till the beginning of the ninth.

The German mode of writing was improved by Charlemagne, and this improvement occasioned another distinction in writing, by introducing the alphabet named *Caroline*, which declined in the 12th century, and was succeeded in the 13th by the modern Gothic. In France it had degenerated by the middle of the 10th century, but was restored in 987 by Hugh Capet, whence it obtained the name of *Capetian*. It was used in England, as well as Germany and France.

The modern Gothic, which spread itself all over Europe in the 12th and 13th centuries, is improperly named, as not deriving its origin from the writing anciently used by the Goths. It is, however, the worst and most barbarous way of writing, and originated among the schoolmen in the decline of the arts; being

N^o 13.

indeed nothing else than Latin writing degenerated. Alphabet. It began in the 12th century, and was in general use, especially among monks and schoolmen, in all parts of Europe, till the restoration of arts in the 15th century, and continued longer in Germany and the northern nations. Our statute-books are still printed in Gothic letters. The most barbarous writing of the seventh, eighth, and ninth centuries, was preferable to the modern Gothic. It is diversified in such a manner as can scarce admit of description; and the abbreviations used by the writers were so numerous, that it became very difficult to read it; which was one of the great causes of the ignorance of those times. Along with this, however, the Lombardic, Gothic, Roman, Caroline, and Copetian modes of writing, were occasionally used by individuals.

The idea that all the alphabets above mentioned are derived from the Roman, tends to prove the distinction of national writing, and is of great use in discovering the age of manuscripts: for though we may not be able exactly to determine the time when a manuscript was written, we may be able nearly to ascertain its age. For example, if a writing is Merovingian, it may be declared not to be posterior to the 9th, nor prior to the 5th, century. If another be Lombardic, it may be affirmed to be posterior to the middle of the 6th, and prior to the 13th. Should it be Saxon, it cannot be of an earlier date than the 7th, nor later than about the middle of the 12th.

Having considered whence the alphabets now in use throughout the various nations of the world are derived, it remains to say something concerning them as the elements of words, or how far they are capable of expressing those sounds, which, by proper combination and arrangement, constitute articulate language. The number of simple sounds in any language cannot be very numerous; and it is plainly these simple sounds alone that we have occasion to represent by alphabetical characters. Hence the person who first invented letters must have been capable of analysing language in a manner which seems by no means easy to do, and concerning which even the learned among ourselves are not yet agreed. It is this difficulty which has produced the great diversity in the number of alphabetical characters used by different nations; and where we see a vast number of them used, we may account the writing not the better, but much the worse for it; and whoever the pretended inventor was, it is more reasonable to suppose that he disfigured an alphabet already invented, by unnecessary additions, than been the author of one himself.

When we consider alphabetical characters as thus resulting from an analysis of language, it will by no means appear probable that it was derived from a gradual and progressive operation of the human mind through many ages. There is not the least affinity betwixt representing any object by a picture and finding out the sounds which compose the word by which it is expressed; nor, though a nation had been in use to represent things either in this method, or by any kind of arbitrary marks, for thousands of years, could the one ever have led to the other. Arbitrary marks must always be the same with pictures in this respect, that they must always be fixed to particular objects, and thus be increased *ad infinitum*. Letters, on the other hand, are indifferent to all

17

Letters could not take place but from a decomposition of language.

18

Probably not the result of a progressive evolution of the human powers.

ALPHABETA ANTIQUISSIMA.

a dextra ad sinistram exarat.

a sinistra ad dextram.

	Phoenicum.	Hebr. ex Medal.	Bastulan.	Etruscum.	Græcum.	Græcum.	Latinum.	Runicum.	Gothicum.	Copticum.	Teutonicum.
1 A	𐤀	א	𐤀	𐤀	Α	Α	A	𐰇	𐰇	𐰇	𐰇
2 B	𐤁	ב	𐤁	𐤁	Β	Β	B	𐰆	𐰆	𐰆	𐰆
3 C	𐤂	ג	𐤂	𐤂	Γ	Γ	C	𐰅, 𐰆	𐰅	𐰅	𐰅
4 D	𐤃	ד	𐤃	𐤃	Δ	Δ	D	𐰄	𐰄	𐰄	𐰄
5 E	𐤄	ה	𐤄	𐤄	Ε	Ε	E	𐰃	𐰃	𐰃	𐰃
6 V F	𐤅	ו	𐤅	𐤅	(Υ)	Υ	F	𐰂, 𐰃	𐰂, 𐰃	𐰂, 𐰃	𐰂, 𐰃
h	𐤆	ח	𐤆	𐤆	Η	Η			𐰁	𐰁	
7 I	𐤇	ז	𐤇	𐤇	Ι	Ι	I	𐰇	𐰇	𐰇	𐰇
8 K	𐤈	כ	𐤈	𐤈	Κ	Κ	K	𐰇*	𐰇	𐰇	𐰇
9 L	𐤉	ל	𐤉	𐤉	Λ	Λ	L	𐰇	𐰇	𐰇	𐰇
10 M	𐤊	מ	𐤊	𐤊	Μ	Μ	M	𐰇	𐰇	𐰇	𐰇
11 N	𐤋	נ	𐤋	𐤋	Ν	Ν	N	𐰇	𐰇	𐰇	𐰇
12 O	𐤌	ו	𐤌	𐤌	Ο	Ο	O	𐰇	𐰇	𐰇	𐰇
13 P	𐤍	פ	𐤍	𐤍	Π	Π	P	𐰇	𐰇	𐰇	𐰇
14 R	𐤎	ר	𐤎	𐤎	Ρ	Ρ	R	𐰇	𐰇	𐰇	𐰇
15 S	𐤏	ש	𐤏	𐤏	Σ	Σ	S	𐰇	𐰇	𐰇	𐰇
16 T	𐤐	ת	𐤐	𐤐	Τ	Τ	T	𐰇	𐰇	𐰇	𐰇
Q	𐤑	ק	𐤑	𐤑					𐰇	𐰇	

ALPHABETUM
Phoenicum.

𐤀 𐤁 𐤂 𐤃 𐤄 𐤅 𐤆 𐤇 𐤈 𐤉 𐤊 𐤋 𐤌 𐤍 𐤎 𐤏 𐤐 𐤑 𐤒 𐤓 𐤔 𐤕 𐤖 𐤗 𐤘 𐤙 𐤚 𐤛 𐤜 𐤝 𐤞 𐤟 𐤠 𐤡 𐤢 𐤣 𐤤 𐤥 𐤦 𐤧 𐤨 𐤩 𐤪 𐤫 𐤬 𐤭 𐤮 𐤯 𐤰 𐤱 𐤲 𐤳 𐤴 𐤵 𐤶 𐤷 𐤸 𐤹 𐤺 𐤻 𐤼 𐤽 𐤾 𐤿 𐥀 𐥁 𐥂 𐥃 𐥄 𐥅 𐥆 𐥇 𐥈 𐥉 𐥊 𐥋 𐥌 𐥍 𐥎 𐥏 𐥐 𐥑 𐥒 𐥓 𐥔 𐥕 𐥖 𐥗 𐥘 𐥙 𐥚 𐥛 𐥜 𐥝 𐥞 𐥟 𐥠 𐥡 𐥢 𐥣 𐥤 𐥥 𐥦 𐥧 𐥨 𐥩 𐥪 𐥫 𐥬 𐥭 𐥮 𐥯 𐥰 𐥱 𐥲 𐥳 𐥴 𐥵 𐥶 𐥷 𐥸 𐥹 𐥺 𐥻 𐥼 𐥽 𐥾 𐥿 𐦀 𐦁 𐦂 𐦃 𐦄 𐦅 𐦆 𐦇 𐦈 𐦉 𐦊 𐦋 𐦌 𐦍 𐦎 𐦏 𐦐 𐦑 𐦒 𐦓 𐦔 𐦕 𐦖 𐦗 𐦘 𐦙 𐦚 𐦛 𐦜 𐦝 𐦞 𐦟 𐦠 𐦡 𐦢 𐦣 𐦤 𐦥 𐦦 𐦧 𐦨 𐦩 𐦪 𐦫 𐦬 𐦭 𐦮 𐦯 𐦰 𐦱 𐦲 𐦳 𐦴 𐦵 𐦶 𐦷 𐦸 𐦹 𐦺 𐦻 𐦼 𐦽 𐦾 𐦿 𐧀 𐧁 𐧂 𐧃 𐧄 𐧅 𐧆 𐧇 𐧈 𐧉 𐧊 𐧋 𐧌 𐧍 𐧎 𐧏 𐧐 𐧑 𐧒 𐧓 𐧔 𐧕 𐧖 𐧗 𐧘 𐧙 𐧚 𐧛 𐧜 𐧝 𐧞 𐧟 𐧠 𐧡 𐧢 𐧣 𐧤 𐧥 𐧦 𐧧 𐧨 𐧩 𐧪 𐧫 𐧬 𐧭 𐧮 𐧯 𐧰 𐧱 𐧲 𐧳 𐧴 𐧵 𐧶 𐧷 𐧸 𐧹 𐧺 𐧻 𐧼 𐧽 𐧾 𐧿 𐨀 𐨁 𐨂 𐨃 𐨄 𐨅 𐨆 𐨇 𐨈 𐨉 𐨊 𐨋 𐨌 𐨍 𐨎 𐨏 𐨐 𐨑 𐨒 𐨓 𐨔 𐨕 𐨖 𐨗 𐨘 𐨙 𐨚 𐨛 𐨜 𐨝 𐨞 𐨟 𐨠 𐨡 𐨢 𐨣 𐨤 𐨥 𐨦 𐨧 𐨨 𐨩 𐨪 𐨫 𐨬 𐨭 𐨮 𐨯 𐨰 𐨱 𐨲 𐨳 𐨴 𐨵 𐨶 𐨷 𐨸 𐨹 𐨺 𐨻 𐨼 𐨽 𐨾 𐨿 𐩀 𐩁 𐩂 𐩃 𐩄 𐩅 𐩆 𐩇 𐩈 𐩉 𐩊 𐩋 𐩌 𐩍 𐩎 𐩏 𐩐 𐩑 𐩒 𐩓 𐩔 𐩕 𐩖 𐩗 𐩘 𐩙 𐩚 𐩛 𐩜 𐩝 𐩞 𐩟 𐩠 𐩡 𐩢 𐩣 𐩤 𐩥 𐩦 𐩧 𐩨 𐩩 𐩪 𐩫 𐩬 𐩭 𐩮 𐩯 𐩰 𐩱 𐩲 𐩳 𐩴 𐩵 𐩶 𐩷 𐩸 𐩹 𐩺 𐩻 𐩼 𐩽 𐩾 𐩿 𐪀 𐪁 𐪂 𐪃 𐪄 𐪅 𐪆 𐪇 𐪈 𐪉 𐪊 𐪋 𐪌 𐪍 𐪎 𐪏 𐪐 𐪑 𐪒 𐪓 𐪔 𐪕 𐪖 𐪗 𐪘 𐪙 𐪚 𐪛 𐪜 𐪝 𐪞 𐪟 𐪠 𐪡 𐪢 𐪣 𐪤 𐪥 𐪦 𐪧 𐪨 𐪩 𐪪 𐪫 𐪬 𐪭 𐪮 𐪯 𐪰 𐪱 𐪲 𐪳 𐪴 𐪵 𐪶 𐪷 𐪸 𐪹 𐪺 𐪻 𐪼 𐪽 𐪾 𐪿 𐫀 𐫁 𐫂 𐫃 𐫄 𐫅 𐫆 𐫇 𐫈 𐫉 𐫊 𐫋 𐫌 𐫍 𐫎 𐫏 𐫐 𐫑 𐫒 𐫓 𐫔 𐫕 𐫖 𐫗 𐫘 𐫙 𐫚 𐫛 𐫜 𐫝 𐫞 𐫟 𐫠 𐫡 𐫢 𐫣 𐫤 𐫥 𐫦 𐫧 𐫨 𐫩 𐫪 𐫫 𐫬 𐫭 𐫮 𐫯 𐫰 𐫱 𐫲 𐫳 𐫴 𐫵 𐫶 𐫷 𐫸 𐫹 𐫺 𐫻 𐫼 𐫽 𐫾 𐫿 𐬀 𐬁 𐬂 𐬃 𐬄 𐬅 𐬆 𐬇 𐬈 𐬉 𐬊 𐬋 𐬌 𐬍 𐬎 𐬏 𐬐 𐬑 𐬒 𐬓 𐬔 𐬕 𐬖 𐬗 𐬘 𐬙 𐬚 𐬛 𐬜 𐬝 𐬞 𐬟 𐬠 𐬡 𐬢 𐬣 𐬤 𐬥 𐬦 𐬧 𐬨 𐬩 𐬪 𐬫 𐬬 𐬭 𐬮 𐬯 𐬰 𐬱 𐬲 𐬳 𐬴 𐬵 𐬶 𐬷 𐬸 𐬹 𐬺 𐬻 𐬼 𐬽 𐬾 𐬿 𐭀 𐭁 𐭂 𐭃 𐭄 𐭅 𐭆 𐭇 𐭈 𐭉 𐭊 𐭋 𐭌 𐭍 𐭎 𐭏 𐭐 𐭑 𐭒 𐭓 𐭔 𐭕 𐭖 𐭗 𐭘 𐭙 𐭚 𐭛 𐭜 𐭝 𐭞 𐭟 𐭠 𐭡 𐭢 𐭣 𐭤 𐭥 𐭦 𐭧 𐭨 𐭩 𐭪 𐭫 𐭬 𐭭 𐭮 𐭯 𐭰 𐭱 𐭲 𐭳 𐭴 𐭵 𐭶 𐭷 𐭸 𐭹 𐭺 𐭻 𐭼 𐭽 𐭾 𐭿 𐮀 𐮁 𐮂 𐮃 𐮄 𐮅 𐮆 𐮇 𐮈 𐮉 𐮊 𐮋 𐮌 𐮍 𐮎 𐮏 𐮐 𐮑 𐮒 𐮓 𐮔 𐮕 𐮖 𐮗 𐮘 𐮙 𐮚 𐮛 𐮜 𐮝 𐮞 𐮟 𐮠 𐮡 𐮢 𐮣 𐮤 𐮥 𐮦 𐮧 𐮨 𐮩 𐮪 𐮫 𐮬 𐮭 𐮮 𐮯 𐮰 𐮱 𐮲 𐮳 𐮴 𐮵 𐮶 𐮷 𐮸 𐮹 𐮺 𐮻 𐮼 𐮽 𐮾 𐮿 𐯀 𐯁 𐯂 𐯃 𐯄 𐯅 𐯆 𐯇 𐯈 𐯉 𐯊 𐯋 𐯌 𐯍 𐯎 𐯏 𐯐 𐯑 𐯒 𐯓 𐯔 𐯕 𐯖 𐯗 𐯘 𐯙 𐯚 𐯛 𐯜 𐯝 𐯞 𐯟 𐯠 𐯡 𐯢 𐯣 𐯤 𐯥 𐯦 𐯧 𐯨 𐯩 𐯪 𐯫 𐯬 𐯭 𐯮 𐯯 𐯰 𐯱 𐯲 𐯳 𐯴 𐯵 𐯶 𐯷 𐯸 𐯹 𐯺 𐯻 𐯼 𐯽 𐯾 𐯿 𐰀 𐰁 𐰂 𐰃 𐰄 𐰅 𐰆 𐰇 𐰈 𐰉 𐰊 𐰋 𐰌 𐰍 𐰎 𐰏 𐰐 𐰑 𐰒 𐰓 𐰔 𐰕 𐰖 𐰗 𐰘 𐰙 𐰚 𐰛 𐰜 𐰝 𐰞 𐰟 𐰠 𐰡 𐰢 𐰣 𐰤 𐰥 𐰦 𐰧 𐰨 𐰩 𐰪 𐰫 𐰬 𐰭 𐰮 𐰯 𐰰 𐰱 𐰲 𐰳 𐰴 𐰵 𐰶 𐰷 𐰸 𐰹 𐰺 𐰻 𐰼 𐰽 𐰾 𐰿 𐱀 𐱁 𐱂 𐱃 𐱄 𐱅 𐱆 𐱇 𐱈 𐱉 𐱊 𐱋 𐱌 𐱍 𐱎 𐱏 𐱐 𐱑 𐱒 𐱓 𐱔 𐱕 𐱖 𐱗 𐱘 𐱙 𐱚 𐱛 𐱜 𐱝 𐱞 𐱟 𐱠 𐱡 𐱢 𐱣 𐱤 𐱥 𐱦 𐱧 𐱨 𐱩 𐱪 𐱫 𐱬 𐱭 𐱮 𐱯 𐱰 𐱱 𐱲 𐱳 𐱴 𐱵 𐱶 𐱷 𐱸 𐱹 𐱺 𐱻 𐱼 𐱽 𐱾 𐱿 𐲀 𐲁 𐲂 𐲃 𐲄 𐲅 𐲆 𐲇 𐲈 𐲉 𐲊 𐲋 𐲌 𐲍 𐲎 𐲏 𐲐 𐲑 𐲒 𐲓 𐲔 𐲕 𐲖 𐲗 𐲘 𐲙 𐲚 𐲛 𐲜 𐲝 𐲞 𐲟 𐲠 𐲡 𐲢 𐲣 𐲤 𐲥 𐲦 𐲧 𐲨 𐲩 𐲪 𐲫 𐲬 𐲭 𐲮 𐲯 𐲰 𐲱 𐲲 𐲳 𐲴 𐲵 𐲶 𐲷 𐲸 𐲹 𐲺 𐲻 𐲼 𐲽 𐲾 𐲿 𐳀 𐳁 𐳂 𐳃 𐳄 𐳅 𐳆 𐳇 𐳈 𐳉 𐳊 𐳋 𐳌 𐳍 𐳎 𐳏 𐳐 𐳑 𐳒 𐳓 𐳔 𐳕 𐳖 𐳗 𐳘 𐳙 𐳚 𐳛 𐳜 𐳝 𐳞 𐳟 𐳠 𐳡 𐳢 𐳣 𐳤 𐳥 𐳦 𐳧 𐳨 𐳩 𐳪 𐳫 𐳬 𐳭 𐳮 𐳯 𐳰 𐳱 𐳲 𐳳 𐳴 𐳵 𐳶 𐳷 𐳸 𐳹 𐳺 𐳻 𐳼 𐳽 𐳾 𐳿 𐴀 𐴁 𐴂 𐴃 𐴄 𐴅 𐴆 𐴇 𐴈 𐴉 𐴊 𐴋 𐴌 𐴍 𐴎 𐴏 𐴐 𐴑 𐴒 𐴓 𐴔 𐴕 𐴖 𐴗 𐴘 𐴙 𐴚 𐴛 𐴜 𐴝 𐴞 𐴟 𐴠 𐴡 𐴢 𐴣 𐴤 𐴥 𐴦 𐴧 𐴨 𐴩 𐴪 𐴫 𐴬 𐴭 𐴮 𐴯 𐴰 𐴱 𐴲 𐴳 𐴴 𐴵 𐴶 𐴷 𐴸 𐴹 𐴺 𐴻 𐴼 𐴽 𐴾 𐴿 𐵀 𐵁 𐵂 𐵃 𐵄 𐵅 𐵆 𐵇 𐵈 𐵉 𐵊 𐵋 𐵌 𐵍 𐵎 𐵏 𐵐 𐵑 𐵒 𐵓 𐵔 𐵕 𐵖 𐵗 𐵘 𐵙 𐵚 𐵛 𐵜 𐵝 𐵞 𐵟 𐵠 𐵡 𐵢 𐵣 𐵤 𐵥 𐵦 𐵧 𐵨 𐵩 𐵪 𐵫 𐵬 𐵭 𐵮 𐵯 𐵰 𐵱 𐵲 𐵳 𐵴 𐵵 𐵶 𐵷 𐵸 𐵹 𐵺 𐵻 𐵼 𐵽 𐵾 𐵿 𐶀 𐶁 𐶂 𐶃 𐶄 𐶅 𐶆 𐶇 𐶈 𐶉 𐶊 𐶋 𐶌 𐶍 𐶎 𐶏 𐶐 𐶑 𐶒 𐶓 𐶔 𐶕 𐶖 𐶗 𐶘 𐶙 𐶚 𐶛 𐶜 𐶝 𐶞 𐶟 𐶠 𐶡 𐶢 𐶣 𐶤 𐶥 𐶦 𐶧 𐶨 𐶩 𐶪 𐶫 𐶬 𐶭 𐶮 𐶯 𐶰 𐶱 𐶲 𐶳 𐶴 𐶵 𐶶 𐶷 𐶸 𐶹 𐶺 𐶻 𐶼 𐶽 𐶾 𐶿 𐷀 𐷁 𐷂 𐷃 𐷄 𐷅 𐷆 𐷇 𐷈 𐷉 𐷊 𐷋 𐷌 𐷍 𐷎 𐷏 𐷐 𐷑 𐷒 𐷓 𐷔 𐷕 𐷖 𐷗 𐷘 𐷙 𐷚 𐷛 𐷜 𐷝 𐷞 𐷟 𐷠 𐷡 𐷢 𐷣 𐷤 𐷥 𐷦 𐷧 𐷨 𐷩 𐷪 𐷫 𐷬 𐷭 𐷮 𐷯 𐷰 𐷱 𐷲 𐷳 𐷴 𐷵 𐷶 𐷷 𐷸 𐷹 𐷺 𐷻 𐷼 𐷽 𐷾 𐷿 𐸀 𐸁 𐸂 𐸃 𐸄 𐸅 𐸆 𐸇 𐸈 𐸉 𐸊 𐸋 𐸌 𐸍 𐸎 𐸏 𐸐 𐸑 𐸒 𐸓 𐸔 𐸕 𐸖 𐸗 𐸘 𐸙 𐸚 𐸛 𐸜 𐸝 𐸞 𐸟 𐸠 𐸡 𐸢 𐸣 𐸤 𐸥 𐸦 𐸧 𐸨 𐸩 𐸪 𐸫 𐸬 𐸭 𐸮 𐸯 𐸰 𐸱 𐸲 𐸳 𐸴 𐸵 𐸶 𐸷 𐸸 𐸹 𐸺 𐸻 𐸼 𐸽 𐸾 𐸿 𐹀 𐹁 𐹂 𐹃 𐹄 𐹅 𐹆 𐹇 𐹈 𐹉 𐹊 𐹋 𐹌 𐹍 𐹎 𐹏 𐹐 𐹑 𐹒 𐹓 𐹔 𐹕 𐹖 𐹗 𐹘 𐹙 𐹚 𐹛 𐹜 𐹝 𐹞 𐹟 𐹠 𐹡 𐹢 𐹣 𐹤 𐹥 𐹦 𐹧 𐹨 𐹩 𐹪 𐹫 𐹬 𐹭 𐹮 𐹯 𐹰 𐹱 𐹲 𐹳 𐹴 𐹵 𐹶 𐹷 𐹸 𐹹 𐹺 𐹻 𐹼 𐹽 𐹾 𐹿 𐺀 𐺁 𐺂 𐺃 𐺄 𐺅 𐺆 𐺇 𐺈 𐺉 𐺊 𐺋 𐺌 𐺍 𐺎 𐺏 𐺐 𐺑 𐺒 𐺓 𐺔 𐺕 𐺖 𐺗 𐺘 𐺙 𐺚 𐺛 𐺜 𐺝 𐺞 𐺟 𐺠 𐺡 𐺢 𐺣 𐺤 𐺥 𐺦 𐺧 𐺨 𐺩 𐺪 𐺫 𐺬 𐺭 𐺮 𐺯 𐺰 𐺱 𐺲 𐺳 𐺴 𐺵 𐺶 𐺷 𐺸 𐺹 𐺺 𐺻 𐺼 𐺽 𐺾 𐺿 𐻀 𐻁 𐻂 𐻃 𐻄 𐻅 𐻆 𐻇 𐻈 𐻉 𐻊 𐻋 𐻌 𐻍 𐻎 𐻏 𐻐 𐻑 𐻒 𐻓 𐻔 𐻕 𐻖 𐻗 𐻘 𐻙 𐻚 𐻛 𐻜 𐻝 𐻞 𐻟 𐻠 𐻡 𐻢 𐻣 𐻤 𐻥 𐻦 𐻧 𐻨 𐻩 𐻪 𐻫 𐻬 𐻭 𐻮 𐻯 𐻰 𐻱 𐻲 𐻳 𐻴 𐻵 𐻶 𐻷 𐻸 𐻹 𐻺 𐻻 𐻼 𐻽 𐻾 𐻿 𐼀 𐼁 𐼂 𐼃 𐼄 𐼅 𐼆 𐼇 𐼈 𐼉 𐼊 𐼋 𐼌 𐼍 𐼎 𐼏 𐼐 𐼑 𐼒 𐼓 𐼔 𐼕 𐼖 𐼗 𐼘 𐼙 𐼚 𐼛 𐼜 𐼝 𐼞 𐼟 𐼠 𐼡 𐼢 𐼣 𐼤 𐼥 𐼦 𐼧 𐼨 𐼩 𐼪 𐼫 𐼬 𐼭 𐼮 𐼯 𐼰 𐼱 𐼲 𐼳 𐼴 𐼵 𐼶 𐼷 𐼸 𐼹 𐼺 𐼻 𐼼 𐼽 𐼾 𐼿 𐽀 𐽁 𐽂 𐽃 𐽄 𐽅 𐽆 𐽇 𐽈 𐽉 𐽊 𐽋 𐽌 𐽍 𐽎 𐽏 𐽐 𐽑 𐽒 𐽓 𐽔 𐽕 𐽖 𐽗 𐽘 𐽙 𐽚 𐽛 𐽜 𐽝 𐽞 𐽟 𐽠 𐽡 𐽢 𐽣 𐽤 𐽥 𐽦 𐽧 𐽨 𐽩 𐽪 𐽫 𐽬 𐽭 𐽮 𐽯 𐽰 𐽱 𐽲 𐽳 𐽴 𐽵 𐽶 𐽷 𐽸 𐽹 𐽺 𐽻 𐽼 𐽽 𐽾 𐽿 𐾀 𐾁 𐾂 𐾃 𐾄 𐾅 𐾆 𐾇 𐾈 𐾉 𐾊 𐾋 𐾌 𐾍 𐾎 𐾏 𐾐 𐾑 𐾒 𐾓 𐾔 𐾕 𐾖 𐾗 𐾘 𐾙 𐾚 𐾛 𐾜 𐾝 𐾞 𐾟 𐾠 𐾡 𐾢 𐾣 𐾤 𐾥 𐾦 𐾧 𐾨 𐾩 𐾪 𐾫 𐾬 𐾭 𐾮 𐾯 𐾰 𐾱 𐾲 𐾳 𐾴 𐾵 𐾶 𐾷 𐾸 𐾹 𐾺 𐾻 𐾼 𐾽 𐾾 𐾿 𐿀 𐿁 𐿂 𐿃 𐿄 𐿅 𐿆 𐿇 𐿈 𐿉 𐿊 𐿋 𐿌 𐿍 𐿎 𐿏 𐿐 𐿑 𐿒 𐿓 𐿔 𐿕 𐿖 𐿗 𐿘 𐿙 𐿚 𐿛 𐿜 𐿝 𐿞 𐿟 𐿠 𐿡 𐿢 𐿣 𐿤 𐿥 𐿦 𐿧 𐿨 𐿩 𐿪 𐿫 𐿬 𐿭 𐿮 𐿯 𐿰 𐿱 𐿲 𐿳 𐿴 𐿵 𐿶 𐿷 𐿸 𐿹 𐿺 𐿻 𐿼 𐿽 𐿾 𐿿 𐻀 𐻁 𐻂 𐻃 𐻄 𐻅 𐻆 𐻇 𐻈 𐻉 𐻊 𐻋 𐻌 𐻍 𐻎 𐻏 𐻐 𐻑 𐻒 𐻓 𐻔 𐻕 𐻖 𐻗 𐻘 𐻙 𐻚 𐻛 𐻜 𐻝 𐻞 𐻟 𐻠 𐻡 𐻢 𐻣 𐻤 𐻥 𐻦 𐻧 𐻨 𐻩 𐻪 𐻫 𐻬 𐻭 𐻮 𐻯 𐻰 𐻱 𐻲 𐻳 𐻴 𐻵 𐻶 𐻷 𐻸 𐻹 𐻺 𐻻 𐻼 𐻽 𐻾 𐻿 𐼀 𐼁 𐼂 𐼃 𐼄 𐼅 𐼆 𐼇 𐼈 𐼉 𐼊 𐼋 𐼌 𐼍 𐼎 𐼏 𐼐 𐼑 𐼒 𐼓 𐼔 𐼕 𐼖 𐼗 𐼘 𐼙 𐼚 𐼛 𐼜 𐼝 𐼞 𐼟 𐼠 𐼡 𐼢 𐼣 𐼤 𐼥 𐼦 𐼧 𐼨 𐼩 𐼪 𐼫 𐼬 𐼭 𐼮 𐼯 𐼰 𐼱 𐼲 𐼳 𐼴 𐼵 𐼶 𐼷 𐼸 𐼹 𐼺 𐼻 𐼼 𐼽 𐼾 𐼿 𐽀 𐽁 𐽂 𐽃 𐽄 𐽅 𐽆 𐽇 𐽈 𐽉 𐽊 𐽋 𐽌 𐽍 𐽎 𐽏 𐽐 𐽑 𐽒 𐽓 𐽔 𐽕 𐽖 𐽗 𐽘 𐽙 𐽚 𐽛 𐽜 𐽝 𐽞 𐽟 𐽠 𐽡 𐽢 𐽣 𐽤 𐽥 𐽦 𐽧 𐽨 𐽩 𐽪 𐽫 𐽬 𐽭 𐽮 𐽯 𐽰 𐽱 𐽲 𐽳 𐽴 𐽵 𐽶 𐽷 𐽸 𐽹 𐽺 𐽻 𐽼 𐽽 𐽾 𐽿 𐾀 𐾁 𐾂 𐾃 𐾄 𐾅 𐾆 𐾇 𐾈 𐾉 𐾊 𐾋 𐾌 𐾍 𐾎 𐾏 𐾐 𐾑 𐾒 𐾓 𐾔 𐾕 𐾖 𐾗 𐾘 𐾙 𐾚 𐾛 𐾜 𐾝 𐾞 𐾟 𐾠 𐾡 𐾢 𐾣 𐾤 𐾥 𐾦 𐾧 𐾨 𐾩 𐾪 𐾫 𐾬 𐾭 𐾮 𐾯 𐾰 𐾱 𐾲 𐾳 𐾴 𐾵 𐾶 𐾷

ALPHABETA ANTIQVA.

Plate X.

<i>Punicum.</i>		<i>Pelasgicū.</i>	<i>Oscan.</i>	<i>Arcadian.</i>	<i>Galli. antiq.</i>		<i>Phœnicium Heb̄r. antiq. sive Samaritanum.</i>		<i>general. Etruscorum.</i>	
A	Ⲁ	ⲀⲀⲀ	Ⲁ	ⲀⲀ	ⲀⲀⲀⲀ	ⲀⲀⲀⲀⲀ	ⲀⲀⲀⲀⲀⲀⲀⲀ	Ⲁ	Ⲁ	ⲀⲀⲀⲀⲀⲀⲀⲀ
B	Ⲁ	ⲀⲀⲀ	Ⲁ	Ⲁ	Ⲁ	Ⲁ	ⲀⲀⲀⲀⲀⲀⲀⲀ	Ⲁ	Ⲁ	ⲀⲀⲀⲀⲀⲀⲀⲀ
Ch	Ⲁ	Ⲁ	CH. Ⲁ	Ⲁ	Ⲁ	Ⲁ	ⲀⲀⲀⲀⲀⲀⲀⲀ	Ch	Ch	ⲀⲀⲀⲀⲀⲀⲀⲀ
D	Ⲁ	Ⲁ	Ⲁ	Ⲁ	Ⲁ	Ⲁ	ⲀⲀⲀⲀⲀⲀⲀⲀ	D	D	ⲀⲀⲀⲀⲀⲀⲀⲀ
E	Ⲁ	ⲀⲀⲀ	Ⲁ	Ⲁ	Ⲁ	Ⲁ	ⲀⲀⲀⲀⲀⲀⲀⲀ	E	E	ⲀⲀⲀⲀⲀⲀⲀⲀ
V	ⲀⲀⲀ	ⲀⲀ	Ⲁ	Ⲁ	Ⲁ	Ⲁ	ⲀⲀⲀⲀⲀⲀⲀⲀ	V	V	ⲀⲀⲀⲀⲀⲀⲀⲀ
Z	Ⲁ	Ⲁ	Ⲁ	Ⲁ	Ⲁ	Ⲁ	ⲀⲀⲀⲀⲀⲀⲀⲀ	Z	Z	ⲀⲀⲀⲀⲀⲀⲀⲀ
H	Ⲁ	ⲀⲀ	ⲀⲀ	Ⲁ	Ⲁ	Ⲁ	ⲀⲀⲀⲀⲀⲀⲀⲀ	H	H	ⲀⲀⲀⲀⲀⲀⲀⲀ
Th	Ⲁ	Ⲁ	Ⲁ	Ⲁ	Ⲁ	Ⲁ	ⲀⲀⲀⲀⲀⲀⲀⲀ	Th	Th	ⲀⲀⲀⲀⲀⲀⲀⲀ
I	Ⲁ	Ⲁ	Ⲁ	Ⲁ	Ⲁ	Ⲁ	ⲀⲀⲀⲀⲀⲀⲀⲀ	I	I	ⲀⲀⲀⲀⲀⲀⲀⲀ
K	ⲀⲀⲀ	ⲀⲀⲀ	Ⲁ	Ⲁ	Ⲁ	Ⲁ	ⲀⲀⲀⲀⲀⲀⲀⲀ	K	K	ⲀⲀⲀⲀⲀⲀⲀⲀ
L	Ⲁ	ⲀⲀⲀ	Ⲁ	Ⲁ	Ⲁ	Ⲁ	ⲀⲀⲀⲀⲀⲀⲀⲀ	L	L	ⲀⲀⲀⲀⲀⲀⲀⲀ
M	Ⲁ	Ⲁ	Ⲁ	Ⲁ	Ⲁ	Ⲁ	ⲀⲀⲀⲀⲀⲀⲀⲀ	M	M	ⲀⲀⲀⲀⲀⲀⲀⲀ
N	Ⲁ	ⲀⲀ	Ⲁ	Ⲁ	Ⲁ	Ⲁ	ⲀⲀⲀⲀⲀⲀⲀⲀ	N	N	ⲀⲀⲀⲀⲀⲀⲀⲀ
S	ⲀⲀⲀ	ⲀⲀⲀ	Ⲁ	Ⲁ	Ⲁ	Ⲁ	ⲀⲀⲀⲀⲀⲀⲀⲀ	S	S	ⲀⲀⲀⲀⲀⲀⲀⲀ
O	ⲀⲀ	Ⲁ	Ⲁ	Ⲁ	Ⲁ	Ⲁ	ⲀⲀⲀⲀⲀⲀⲀⲀ	O	O	ⲀⲀⲀⲀⲀⲀⲀⲀ
P	Ⲁ	ⲀⲀ	Ⲁ	Ⲁ	Ⲁ	Ⲁ	ⲀⲀⲀⲀⲀⲀⲀⲀ	P	P	ⲀⲀⲀⲀⲀⲀⲀⲀ
Ts	ⲀⲀⲀ	Ⲁ	Ⲁ	Ⲁ	Ⲁ	Ⲁ	ⲀⲀⲀⲀⲀⲀⲀⲀ	Ts	Ts	ⲀⲀⲀⲀⲀⲀⲀⲀ
Q	Ⲁ	Ⲁ	Ⲁ	Ⲁ	Ⲁ	Ⲁ	ⲀⲀⲀⲀⲀⲀⲀⲀ	Q	Q	ⲀⲀⲀⲀⲀⲀⲀⲀ
R	ⲀⲀⲀ	ⲀⲀⲀ	ⲀⲀ	ⲀⲀ	ⲀⲀ	ⲀⲀ	ⲀⲀⲀⲀⲀⲀⲀⲀ	R	R	ⲀⲀⲀⲀⲀⲀⲀⲀ
Sch	ⲀⲀ	ⲀⲀ	Ⲁ	Ⲁ	Ⲁ	Ⲁ	ⲀⲀⲀⲀⲀⲀⲀⲀ	Sch	Sch	ⲀⲀⲀⲀⲀⲀⲀⲀ
T	ⲀⲀ	ⲀⲀⲀ	Ⲁ	Ⲁ	Ⲁ	Ⲁ	ⲀⲀⲀⲀⲀⲀⲀⲀ	T	T	ⲀⲀⲀⲀⲀⲀⲀⲀ
V	Ⲁ	Ⲁ	Ⲁ	Ⲁ	Ⲁ	Ⲁ	ⲀⲀⲀⲀⲀⲀⲀⲀ	V	V	ⲀⲀⲀⲀⲀⲀⲀⲀ

Alphabet. all objects; and therefore, by their combinations, which are more numerous than as many arbitrary marks as we could remember, may express all the objects in nature. This might furnish an argument of some strength for the divine revelation of writing, were it not that other arts, seemingly as useful, and as difficult to be invented, had not been expressly ascribed to particular persons whom we cannot suppose to have been divinely inspired. Thus metallurgy, music, the keeping of cattle, and use of tents, are all ascribed to a single family; and though writing be not expressly mentioned as an invention in Scripture, there is no reason to have recourse to a revelation for it as long as the human faculties are known to have been sufficient for the invention of it. Nevertheless, if we take a review of the different arts which mankind have invented, we shall find, that few of them resulted from any gradual progress or evolution of the powers of the human mind, but rather by some sudden and almost unaccountable turn of thought in an individual. Thus, the art of printing, little inferior in its utility to that of writing, lay hid for ages, and was at last invented we scarce know how; so that if one inclined to suppose this a divine revelation, he could be at little loss for arguments to support his hypothesis. This was what all the inventions and evolutions of human powers since the creation had never been able to accomplish; yet no body believes that it required supernatural abilities to be the author of this art, because we see plainly that it might have occurred to the human mind from various sources, and are surprised that it did not occur long before. In like manner, the method of accounting for the celestial motions by the united forces of projection and gravitation, was no result of the progress that mankind had made in science, but luckily occurred to Mr Horrox, without any thing that we know to direct him, or perhaps from causes almost unknown to himself. Thus also, the steam-engine, aërostation, &c. were suddenly invented only by a slight review of principles well known before, and which had been a thousand times overlooked by those who might have invented both. Alphabetic writing, therefore, might have been no deduction from hieroglyphic or picture writing, from which it is essentially different; and it seems to be some confirmation of this, that all nations who ever pretended to the invention of letters, have ascribed it to the labours of one particular person, without taking notice of the progress made towards it in preceding ages.

19
Of the elementary
sounds of
language.

The learned author of *Hermes* informs us, that to about 20 plain elementary sounds we owe that variety of articulate voices which have been sufficient to explain the sentiments of such an innumerable multitude as all the past and present generations of men. Mr Sheridan says, that the number of simple sounds in our tongue are 28; while Dr Kenrick says, that we have only 11 distinct species of articulate sounds, which even by contraction, prolongation, and composition, are increased only to the number of 16; every syllable or articulate sound in our language being one of the number. Bishop Wilkins and Dr William Holder speak of 33 distinct sounds.

After the analysis or decomposition of language into the elementary sounds, the next towards the notation of it by alphabetical characters, would be the de-

VOL. I. Part II.

lineation of a separate mark or letter to represent each sound; which marks, though few in number, would admit of such a variety of arrangements and combinations, as might be capable of producing that infinity of articulate sounds which compose language. The ingenious Wachter, in his *Natura et Scriptura Concordia*, p. 64. endeavours to show, that ten marks or characters are sufficient for this purpose.—His scheme is as follows:

Genus.	Figura.	Potestas.
Vocal.	○	a. e. i. o. u.
Guttural.	○ 	k. c. ch. q. g. h.
Lingual.	∟	l.
Lingual.	∩	d. t.
Lingual.	—∩	r.
Dental.	∏	f.
Labial.	3	b. p.
Labial.	∩	m.
Labial.	⊥	s. ph. v. w.
Nasal.	Λ	n.

If this is the case, then the most simple alphabet, which consisted only of 13 letters, must have been abundantly sufficient to answer all the purposes of mankind, and much of our twenty-four letter alphabet may appear superfluous. That able mathematician Tacquet has calculated the various combinations of the 24 letters, even without any repetition, to amount to no fewer than 620,448,401,733,239,439,360,000; while Clavius makes them only 5,852,616,738,497,664,000. Either of these numbers, however, is infinite to the human conceptions, and much more than sufficient to express all the sounds that ever were articulated by man.

As there are more sounds in some languages than in others, it follows of course, that the number of elementary characters, or letters, must vary in the alphabets of different languages. The Hebrew, Samaritan, and Syriac alphabets, have 22 letters; the Arabic 28, the Persian and Egyptian, or Coptic, 32; the present Russian 41; the Sanscrit 50; while the Cashmirian and Malabaric are still more numerous. The following is the scheme of the English alphabet, as given by Mr Sheridan in his *Rhetorical Grammar*, p. 9.

Number of simple sounds in our tongue 28.

9 Vowels, a a a e o o e i u
hall hat hate beer note noose bet fit but
w y
short oo short ee

19 Consonants, { eb ed ef eg ek el em en ep er es
et ev ez et h eth ezh ezh ing.

2 Superfluous, c, which has the power of ck or es; q, that of ek before u.

3 R

2 Compound,

20
Number of
letters in
different
alphabets.

Alphabet.

- 2 Compound, *j*, which stands for *edzh*;
x, for *ks* or *gz*.
 1 No letter, *h*, merely a mark of aspiration.

Consonants divided into Mutes and Semivowels.

- 6 Mutes, eb ed eg ek ep et.
 3 Pure Mutes, ek ep et.
 3 Impure, eb ed eg.
 13 Semivowels, } ef el em en er es ev ez et *h* eth
 or liquids, } esh ezh ing.
 9 Vocal, el em en er ev ez eth ezh ing.
 4 Aspirated, ef es et *h* esh.

Divided again into

- 4 Labial, eb ep ev ef.
 8 Dental, ed et eth et *h* ez es ezh esh.
 4 Palatine, eg ek el er.
 3 Nasal em en ing.

21
 Imperfec-
 tion in the
 English al-
 phabet.

Mr Sheridan observes, that our alphabet is ill calculated for the notation of the English tongue, as there are many sounds for which we have no letters or marks: and there ought to be nine more characters or letters to make a complete alphabet, in which every simple sound ought to have a mark peculiar to itself. The reason of the deficiency is, that the Roman alphabet was formerly adopted for the notation of the English language, though by no means suited to the purpose.

22
 Of the
 forms of
 letters.

It now remains only to take some notice of the forms of the different letters; some knowledge of which is absolutely necessary for ascertaining the age and authenticity of inscriptions, manuscripts, charters, and ancient records. Many authors are of opinion, that letters derive their forms from the positions of the organs of speech in their pronunciation. Van Helmont has taken great pains to prove, that the Chaldaic characters are the genuine alphabet of Nature; because, according to him, no letter can be rightly founded without disposing the organs of speech into an uniform position with the figure of each letter; and in support of this system, he has anatomised the organs of articulation.

Mr Nelme has endeavoured to show, that all elementary characters or letters derive their forms from the line and the circle. His alphabet consists of 13 radical letters, four diminished, and four augmented.—The radicals are L, O, S, A, B, C, D, N, U, I, E, M, R.—H, according to him, is derived from A; P from B, T from D; and F from U: these are called diminished letters. The augmented ones are Z from S; G from C; W from U; and Y from I. He proves that his characters are very similar to those of the ancient Etruscans: but all characters are composed either of lines and circles of the former, and of parts of the latter.—Mr Gebelin deduces them from hieroglyphic representations, and has given several delineations of human figures, trees, &c. in confirmation of his hypothesis.

One of the most simple alphabets has been formed, by making two perpendicular and two horizontal lines:

thus, $\begin{array}{c} a|b|c \\ d|e|f \\ g|h|i \end{array}$ from which may be de-

duced nine different characters or letters; thus,

$\begin{array}{c} a|b|c \\ d|e|f \\ g|h|i \end{array}$

Nine more may be made by adding a point to each, Alphænix,

$\begin{array}{c} k|l|m \\ n|o|p \\ q|r|s \end{array}$

Alphery.

and as many more as $\begin{array}{c} n|o|p \\ q|r|s \end{array}$ may be sufficient

for the notation of any language, by adding two or more points to each character. Though these square characters are not calculated for dispatch; yet they may be made as expeditiously, or more so, than the Tartar, the Bramin, the Cashmirian, or many others. Writing composed of these characters, is at first sight somewhat like the Hebrew.—Mr Dow, author of the history of New lan-
 Indoſtan, lately formed a new language and alphabet. This language, and the characters formed for its nota-
 tion, were so easy, that a female of his acquaintance ac-
 quired the knowledge of them in three weeks, and cor-
 responded with him therein during their intimacy.

23
 New lan-
 guage in-
 vented by
 Mr Dow.

ALPHÆNIX, white barley-sugar, to which is given an extraordinary name, to render it more valuable. This sugar, which is thought good for colds, is made of common sugar, which is boiled until it becomes easy to crack, when they pour it upon a marble table, greased with oil of sweet almonds, and mould it into various figures with a brass crotchet. It is easily falsified with starch.

ALPHERY (Mikipher), born in Russia, and of the Imperial line. When that country was torn to pieces by intestine quarrels, in the latter end of the 16th century, and the royal house particularly was so severely persecuted by impostors, this gentleman and his two brothers were sent over to England, and recommended to the care of Mr Joseph Bidell, a Russia merchant. Mr Bidell, when they were of age fit for the university, sent them all three to Oxford, where the small-pox unhappily prevailing, two of them died of it. We know not whether this surviving brother took any degrees or not, but it is very probable he did, since he entered into holy orders; and in the year 1618, had the rectory of Wooley in Huntingdonshire, a living of no very considerable value, being rated at under L. 10 in the king's books. Here he did his duty with great cheerfulness and alacrity; and although he was twice invited back to his native country by some who would have ventured their utmost to have set him on the throne of his ancestors, he chose rather to remain with his flock, and to serve God in the humble station of a parish-priest. Yet in 1643, he underwent the severest trials from the rage of the fanatics; who, not satisfied with depriving him of his living, insulted him in the most barbarous manner; for having procured a file of musqueteers to pull him out of his pulpit, as he was preaching on a Sunday, they turned his wife and small children into the street, into which also they threw his goods. The poor man in this distress raised him a tent under some trees in the church-yard, over against his house, where he and his family lived for a week. One day having gotten a few eggs, he picked up some rotten wood and dry sticks, and with these made a fire in the church-porch, in order to boil them; but some of his adversaries, to show how far they could carry their rage against the church, for this poor man was so harmless they could have none against him, came and kicked about his fire, threw down his skillet, and broke his eggs. After this, having still a little money, he made a small purchase in that neighbourhood, built

him

Alpheus him a house, and lived there some years. He was encouraged to this by a presbyterian minister who came in his room, who honestly paid him the fifth part of the annual income of the living, which was the allowance made by parliament to ejected ministers, treated him with great humanity, and did him all the services in his power. It is a great misfortune that this gentleman's name is not preserved, his conduct in this respect being the more laudable, because it was not a little singular. Afterwards, probably on the death or removal of this gentleman, Mr Alphery left Huntingdonshire, and came and resided at Hammer-smith till the Restoration put him in possession of his living again. He returned on this occasion to Huntingdonshire, where he did not stay long; for being upwards of 80, and withal very infirm, he could not perform the duties of his function. Having, therefore, settled a curate, he retired to his eldest son's house at Hammer-smith, where shortly after he died, full of years and of honour.

ALPHEUS, (Strabo); **ALPHEIUS**, (Ptolemy); a noted and large river of the Peloponnesus; which, rising in, and after several windings running through, Arcadia, and by Olympia in Elis, with a south-west course, pours into the Sinus Chelonites, about ten miles to the south of Olympia. It has a common spring with the Eurotas, at the foot of mount Parthenius, near the village Asca, (Strabo.) The Alpheus and Eurotas mix and run together for 20 stadia; after which, they enter a subterraneous passage at Mantinea; then again emerge, the Eurotas in Laconica, and the Alpheus in the territory of Megalopolis, (Pausanias.) The poets fable strange things of this river; particularly, that, out of love to the nymph *Arethusa*, it runs under the sea to Sicily, and bursts out at the fountain of that name in Syracuse, (Virgil). Its waters were reckoned good in the leprosy, which is called *Alqos* by the Greeks; and hence the name *Alpheus*.—Pausanias adds, that the Eleans had a law, which condemned any woman to death that should either appear at the Olympic games, or even cross this river during that solemnity: and the Eleans add, that the only woman who transgressed it, had disguised herself in the habit of a master or keeper of these games, and conducted her son thither; but when she saw him come off victorious, her joy made her forget her disguise, so that her sex was discovered. She was pardoned, but from that time a law was made that the keepers should appear there naked.

ALPHONSIN, in surgery, an instrument for extracting bullets out of gun-shot wounds. This instrument derives its name from the inventor Alphonfus Ferrier, a physician of Naples. It consists of three branches, which are closed by a ring. When closed and introduced into the wound, the operator draws back the ring towards the handle, upon which the branches opening take hold of the ball; and then the ring is pushed from the haft, by which means the branches grasp the ball so firmly, as to extract it from the wound.

ALPHONSUS X. king of Leon and Castile, surnamed the Wise, was author of the astronomical tables called *Alphonsine*. Reading of Quintus Curtius gave him such delight, that it recovered him out of a dangerous illness. He read the Bible fourteen times, with several comments on it. He is said to have found fault with the structure of the mundane system, and has been

charged with impiety on that score; but unjustly, for he only found fault with the involved system of some astronomers. He was dethroned by his son Sancho; and died of grief, A. D. 1284.

ALPINI (Prospero), a famous physician and botanist, born in the Venetian territory, in 1553. He travelled in Egypt to acquire a knowledge of exotic plants, and was the first who explained the fructification and generation of plants by the sexual system. Upon his return to Venice, in 1586, Andrea Doria, prince of Melfi, appointed him his physician: and he distinguished himself so much in this capacity, that he was esteemed the first physician of his age. The republic of Venice began to be uneasy, that a subject of theirs, of so great merit as Alpini, should continue at Genoa, when he might be of so much service and honour to their state: they therefore recalled him in 1593, to fill the professorship of botany at Padua; and he had a salary of 200 florins, which was afterwards raised to 750. He discharged this office with great reputation; but his health became very precarious, having been much broke by the voyages he had made. According to the register of the university of Padua, he died the 5th of February 1617, in the 64th year of his age; and was buried the day after, without any funeral pomp, in the church of St Anthony.—Alpini wrote the following works in Latin: 1. Of the physic of the Egyptians, in four books. Printed at Venice, 1591, in 4^{to}. 2. A treatise concerning the plants of Egypt. Printed at Venice, 1592, in 4^{to}. 3. A dialogue concerning balsams. Printed at Venice, 1592, in 4^{to}. 4. Seven books concerning the method of forming a judgement of the life or death of patients. Printed at Venice, 1691, in 4^{to}. 5. Thirteen Books concerning methodical Physic. Padua, 1611, folio; Leyden, 1719, in 4^{to}. 6. A Disputation held in the school at Padua, concerning the Raphanticum. Padua, 1612, and 1629, 4^{to}. 7. Of exotic plants, in two books. Venice, 1699, in 4^{to}. He left several other works, which have never been printed; particularly, 8. The fifth book concerning the physic of the Egyptians. 9. Five books concerning the natural history of things observed in Egypt, adorned with a variety of draughts of plants, stones, and animals.

ALPINIA, in botany: A genus of the monogynia order, belonging to the monandria class of plants; and in the natural method ranking under the 8th order, *Scitamineæ*. The characters are: The *calyx* is a perianthium above, small, and trifid: The *corolla* is monopetalous, unequal, and as if doubled: The *stamina* consist of one filament, with linear antheræ joining to the margin: The *pistillum* has a roundish germen, beneath; the stylus simple, and the stigma obtusely trigonous: The *pericarpium* is a fleshy ovate trilocular capsule, with three valves: The *seeds* are ovate, and very numerous; the receptaculum is pulpy and very large. Of this genus there is but one species, which is a native of the West Indies, where it grows naturally in moist places. The leaves decay every winter, and are pushed out from the roots in the spring, like the ginger and maranta; so must be managed in the same manner as directed for these two plants, and may be propagated by parting the roots when the leaves decay.

Alpiste,
Alps.

ALPISTE, or ALPIA, a sort of seed used to feed birds with, especially when they are to be nourished for breeding. The alpiste seed is of an oval figure, of a pale yellow, inclining to an isabel colour, bright and glossy. It is an article of the corn-chandlers and seedsmen's trade.

ALPS (anc. geog.), a range of high mountains, separating Italy from Gaul and Germany, in the form of a crescent. They take their rise from the Vada Sabatia, or Savona; and reach to the Sinus Flanaticus (now Golfo di Carnaro of the Adriatic), and the springs of the river Colapis (now the Kulpe); extending, according to Livy, 2000 stadia in length, or 250 miles: they are divided into several parts, and accordingly have different names. From Savona to the springs of the Varus, where the Alps lie against the sea of Genoa, they are called *Maritime*, now *le Montagne di Tenda*. These extend from south to north, between Gaul to the west, and Genoa to the east, beginning at Monaco on the Mediterranean; then running out thro' the east of the county of Nice, and between that and the marquisate of Saluzzo, terminate at length at mount Viso, between Dauphine and Piedmont. Hence to Susa run the *Alpes Cottiae* (Sueton.); *Cottane* (Tacitus); mountains extremely high, separating Dauphine from Piedmont, and extending from mount Viso to mount Cenis, between the *Alpes Maritimæ* to the south, and the *Graie* to the north. The *Alpes Graie* (Pliny), so called from the passage of Hercules, begin from mount Cenis, where the *Cottiae* terminate; and run out between Savoy and the Tarentese to the west, and Piedmont and the Duché d'Aouste to the east, quite to the Great St Bernard, where the *Alpes Penninae* begin. They are also called by some *Graie Alpes*, and *Graius Mons* (Tacitus); which extend from west to east, between St Bernard and the Adula, or St Godard; and thus they run out between the Vales to the north, and the Milanese to the south. With these are continued the *Alpes Rheticae*, to the head of the river Piave; a part of which are the *Alpes Tridentinae*, to the north of Trent. To these join the *Alpes Noricae*, reaching to Doblach in Tyrol, to the north of the river Tazamento: thence begin the *Alpes Carnicae*, or of *Carniola*, extending to the springs of the Save: and the last, called *Alpes Pannonicae*, and *Juliae*, extend to the springs of the Kulpe. Some, however, extend the Alps to the north of Dalmatia; others, again, to Thrace and the Euxine. But their termination at the Kulpe, as above, is more generally received. They were formerly called *Albia*, and *Alpionia* (Strabo). Through these mountains Hannibal forced his passage into Italy, by pouring vinegar on the rock, heated by burning large piles of wood on them, by which means they became crumbled (Livy). They are covered with perpetual snow.

The Alps are the highest mountains in Europe; being, according to some geometricians, about two miles in perpendicular height. They begin at the Mediterranean; and stretching northward, separate Piedmont and Savoy from the adjacent countries; whence directing their course to the east, they form the boundary between Switzerland and Italy, and terminate near the extremity of the Adriatic Sea, north-east of Venice. It was over the western part of those mountains, towards Piedmont, that Hannibal forced his passage into Italy.

The prospect from many parts of this enormous range of mountains is extremely romantic, especially towards the north-west. One of the most celebrated is the Grande Chartreuse, where is a monastery founded by St Bruno about the year 1084. From Echelles, a little village in the mountains of Savoy, to the top of the Chartreuse, the distance is six miles. Along this course, the road runs winding up, for the most part not six feet broad. On one hand is the rock, with woods of pine trees hanging over head; on the other a prodigious precipice almost perpendicular; at the bottom of which rolls a torrent, that, sometimes tumbling among the fragments of stone which have fallen from on high, and sometimes precipitating itself down vast descents with a noise like thunder, rendered yet more tremendous by the echo from the mountains on each side, concurs to form one of the most solemn, the most romantic, and most astonishing scenes in nature. To this description may be added the strange views made by the craggs and cliffs, and the numerous cascades which throw themselves from the very summit down into the vale. On the top of the mountain is the convent of St Bruno, which is the superior of the whole order. The inhabitants consist of 100 fathers, with 300 servants, who grind their corn, press their wine, and perform every domestic office, even to the making of their clothes. In the Album of the fathers is an admired alcaic ode, written by the late ingenious Mr Gray when he visited the Chartreuse, and which has since been published among his works.

The glaciers of Savoy are also justly reckoned among the most stupendous works of nature. These are immense masses of ice, lodged upon the gentler declivities amidst the Alps, and exhibiting representations beyond conception fantastic and picturesque. In the extraordinary narrative of Mr Bourrit's journey hither, we meet with the following account of the Prieuré, in the valley of Chamouni. We had, says he, the magnificent prospect of a chain of mountains, equally inaccessible, and covered with ice; and above the rest that of Mount Blanc, whose top seemed to reach, and even pierce, the highest region of the clouds. The chain upon which this mountain looks down like a giant, is composed of masses of rocks, which terminate in pikes or spires, called the *Needles*, and which are ranged like tents in a camp. Their sides appear lighter and more airy, from the ornament of several hollow breaks and furrows fretted in the rock itself, as well as from the different streaks and panes of ice and snow, which, without changing the general character of their form, or the majesty of their appearance, give them a picturesque variety. Lower down, the eye surveys with rapture the gills of ice, and the several glaciers, extending almost into the plain, whilst this appears like an artificial garden, embellished with the mixture of a variety of colours. We have a picturesque opposition to this chain, which is formed by innumerable mountains at the distance of near 50 leagues, between whose tops we have a glimpse of those several plains which they environ.

M. de Saussure, who had visited those mountains about two months before M. Bourrit, felt himself naturally electrified in this place. This extraordinary phenomenon seems not to have been experienced by the latter or his company; but they heard a long-continued

Alps. { continued rumbling noise like that of thunder, which was rendered more awful by the silence of the place where they stood. This noise proceeded from the subsequent causes, viz. the avalanches of snow, which separated from the tops of the mountains, and rolled down to the bottom: considerable fragments of the rocks which followed them, overturning others in their fall; and massy blocks of ice, which precipitated from the summits.

The valley of Montanvert appears to be peculiarly romantic. Here, says M. Bourrit, we beheld a spacious icy plain entirely level. Upon this there rose a mountain all of ice, with steps ascending to the top, which seemed the throne of some divinity. It likewise took the form of a grand cascade, whose figure was beyond conception beautiful; and the sun, which shone upon it, gave a sparkling brilliance to the whole. The valley on our right hand was ornamented with prodigious glaciers, that, shooting up to an immeasurable height between the mountains, blend their colours with the skies, which they appear to reach.

ALPS; besides its proper signification, by which it denotes a certain chain of mountains which separate Italy from France and Germany, is frequently used as an appellative to denote any mountains of extraordinary height or extensive range. In this sense, Ausonius and others call the Pyrenean mountains, *Alps*; and Gellius the Spanish Alps, *Alpini Hispani*.

Hence also we say, the *British Alps*, the *Asiatic Alps*, the *Alps of America*.

The *Scottish Alps* terminate in a most sublime and abrupt manner, at the great promontory the Alta Ripa of Ptolemy, the *Ord* or *Aird*, i. e. the *Height, of Caithness*. The upper part is covered with gloomy heath; the lower is a stupendous precipice, excavated into vast caverns, the haunt of seals and different sea-fowl. On the eastern side of the kingdom, this is the striking termination of the vast mountains of Scotland which form its Highlands, the habitation of the original inhabitants, driven from their ancient seats by the ancestors of Lowland Scots, descendants of Saxons, French, and Normans; congenerous with the English; yet absurdly and invidiously distinguished from them. Language, as well as striking natural boundaries, mark their place. Their mountains face on the west the Atlantic ocean; wind along the west of Caithness; among which Morvern and Scaraben, Ben-Hop and Ben-Lugal, arise pre-eminent. Sutherland is entirely alpine, as are Ross-shire and Inverness-shire. Their *Summae Alpes* are, Meal Fourvounich, the Coryarich, Benewich, and Benevish near Fort William; the last of which is reported to be 1450 yards in height. Great part of Aberdeenshire lies in this tract. It boasts of another Morvern, soaring far beyond the others. This is in the centre of the Grampian hills, and perhaps the highest from the sea of any in Great Britain. They again comprehend the eastern part of Perthshire, and finish on the magnificent shores of Lochlomond; on the eastern side of which Benlomond rises, distinguished among its fellows. From hence the rest of North Britain forms a chain of humbler hills; but in Cumberland, part of Westmoreland, Yorkshire, Lancashire, and Derbyshire, the Alps resume their former majesty. A long and tame interval succeeds. The long sublime tract of Wales arises, the ancient possession of the ancient British race. From the

Alps. { Ord, the great mountains recede inland, and leave a vast flat between their bases and the sea, fronting the waves with a series of lofty rocky precipices, as far as the little creek of Staxigo; the whole a bold, but most inhospitable shore for shipping. Wick and Staxigo have indeed their creeks, or rather chasms, which open between the cliffs, and may accidentally prove a retreat, unless in an eastern gale.

The *Asiatic Alps* are described under the articles *ALTAIC Chain* and *WERTURIAN Mountains*.

The *American Alps* are, The *ANDES* or *Cordilleras*, in South America; and the *APALACHIAN* or *Allegany* mountains, in North America.

The highest ground in North America is placed by Captain Carver in lat. 47° west long. from Lond. 98° between a lake from which the Oregon flows, and another called *White-bear Lake*, from which arises the Mississippi.

This exalted situation is part of the Shining Mountains, which are branches of the vast chain which pervades the whole continent of America. It may be fairly taken from the southern extremity, where Staten Land and Terra del Fuego rise out of the sea as insulated links to an immense height, black, rocky, and marked with rugged spired tops, frequently covered with snow. New Georgia may be added as another horribly congenial, rising detached farther to the east. The mountains about the Straits of Magellan soar to an amazing height, and infinitely superior to those of the northern hemisphere under the same degree of latitude. From the north side of the Straits of Magellan, they form a continued chain through the kingdoms of Chili and Peru, preserving a course not remote from the Pacific Ocean. The summits, in many places, are the highest in the world. There are not less than 12, which are from 2400 toises high to above 3000. Pichincha, which impends over Quito, is about 35 leagues from the sea; and its summit is 2430 toises above the surface of the water. Cayambé, immediately under the equator, is above 3000; and Chimborazo higher than the last by 200. Most of them have been volcanic, and in different ages marked with eruptions far more horrible than have been known in other quarters of the globe. They extend from the equator through Chili; in which kingdom is a range of volcanoes, from lat. 26. south, to 45. 30. and possibly from thence into Terra del Fuego itself; which, forming the Straits of Magellan, may have been rent from the continent by some great convulsion, occasioned by their labourings; and New Georgia forced up from the same cause. An unparalleled extent of plain appears on their eastern side. The river of Amazons runs along a level clothed with forests, after it bursts from its confinement at the Pongo of Borjas, till it reaches its sea-like discharge into the Atlantic Ocean.

In the northern hemisphere, the Andes pass through the narrow isthmus of Darien into the kingdom of Mexico, and preserve a majestic height and their volcanic disposition. The mountain Popocatepec made a violent eruption during the expedition of Cortez, which is most beautifully described by his historian Antonio de Solis. This, possibly, is the same with the volcano observed by the Abbé d'Auteroche, in his way from Vera Cruz to Mexico; which, from the nakedness of the lavas, he conjectured to have been but lately

ly

Alps, by extinguished. From the kingdom of Mexico, this chain is continued northward, and to the east of California; then verges so greatly towards the west, as to leave a very inconsiderable space between it and the Pacific Ocean; and frequently detached branches jut into the sea, and form promontories; which, with parts of the chain itself, were often seen by our navigators in the course of their voyage. Some branches, as we have before observed, extend towards the east, but not to any great distance. A plain, rich in woods and savannas, swarming with bisons or buffaloes, stags, and Virginian deer, with bears, and great variety of game, occupies an amazing tract, from the great lakes of Canada, as low as the Gulph of Mexico; and eastward to the other great chain of mountains, the Apalachian, which are the Alps of that side of northern America. Its commencement is supposed to be about Lake Champlain and Lake George, with branches pointing obliquely to the river St Laurence eastward, and rising on its opposite coasts; others extending, with lowering progress, even into our poor remnant of the new world, Nova Scotia. The main chain passes through the province of New York, where it is distinguished by the name of the *Highlands*, and lies within 40 miles of the Atlantic. From thence it recedes from the sea, in proportion as it advances southward; and near its extremity in South Carolina is 300 miles distant from the water. It consists of several parallel ridges, divided by most enchanting vallies, and generally clothed with variety of woods. These ridges rise gradually from the east, one above the other, to the central; from which they gradually fall to the west, into the vast plains of the Mississippi. The middle ridge is of an enormous bulk and height. The whole extends in breadth about 70 miles; and in many places leaves great chasms for the discharge of the vast and numerous rivers which rise in the bosoms of the mountains, and empty themselves into the Atlantic Ocean, after yielding a matchless navigation to the provinces they water.

Beyond the branch of the Apalachian mountains called *The Endless*, is another of amazing extent, nearly as high as the mountains themselves. This plain (called the *Upper Plains*) is exceedingly rich land; begins at the Mohock's River; reaches to within a small distance of Lake Ontario; and to the westward forms part of the extensive plains of the Ohio, and reaches to an unknown distance beyond the Mississippi. Vast rivers take their rise, and fall to every point of the compass; into Lake Ontario, into Hudson's River, and into the Delawar and Susquehanna. The tide of the Hudson's River flows thro' its deep-worn bed far up, even to within a small distance of the head of the Delawar; which, after a furious course down a long descent, interrupted with rapids, meets the tide not very remote from its discharge into the ocean.

ALPUXARRAS, or ALPAXARES, mountains of Spain, in the province of Granada, on the coast of the Mediterranean sea. They are about 17 leagues in length, and 11 in breadth, reaching from the city of Velez to Almeria. They are inhabited by Moors, who are the remains of the dispersion and ruin of their empire. They embraced the Christian religion; but preserve their own manner of living, and their language,

though much corrupted. Here is a rivulet between Pitros and Portugos, which dyes linen that is dipped in it black in an instant. Near this rivulet is a cavern, from which proceeds so malignant a steam, that it destroys such animals as come near it. The Moriscos cultivate the soil extremely well, and plant fruit-trees; some of which grow to a prodigious height and thickness, and give the mountains a very agreeable aspect.

ALQUIER, a liquid measure, used in Portugal to measure oil, two of which make an almond. See ALMOND.

ALQUIFOU, or ARQUIFOU, is a sort of lead-ore, which, when broken, looks like antimony. It is used by the potters to give a green varnish to their works, and thence is called potter's ore. It is met with in Cornwall, &c. The potters mix a small portion of manganese with the alquifou, and then the varnish or glazing on their ware is of a blackish hue.

ALREDUS, ALURED, or ALUREDUS, of Beverley, one of the most ancient and best English historians. He wrote in the reign of Henry I. There are no circumstances of his life known with any degree of certainty. It is generally believed that he was educated at Cambridge, and that he afterwards became one of the canons and treasurer of St John's at Beverley. And we learn in a note of bishop Tanner's, that, for the sake of improvement, he travelled through France and Italy; and that at Rome he became domestic chaplain to cardinal Othobonie. He died in the year 1128 or 1129; leaving behind him the following works: 1. *The Annals of Alured of Beverley*, Oxford, 1726. Published by Mr Hearne, from a manuscript belonging to Thomas Rawlinson, Esq. It contains an abridgement of our history from Brutus to Henry I. written in good Latin; and with great accuracy. 2. *Libertates ecclesie S. Johannis de Beverlac*, &c. a manuscript in the Cotton library. It is a collection of records relative to the church at Beverley, translated by our author from the Saxon language. The Biographia Britannica evidently proves these to be all that were written by Alredus.

ALRESFORD, a town of Hampshire, seated on the road from London to Southampton, close by the river Itching, which feeds a great pond to the left of the town. Part of a Roman highway runs from hence to Alton. It is a rectory, with the mediety of Old Alresford, of L. 49 : 12 : 8 in the king's books. It consists of about 200 houses; has one church; two principal streets, which are large and broad; and a small manufacture of linseys.

ALSA, a river of Carniola (Pliny), now the *Ausa*; running by Aquileia, with a short course from north to south, into the Adriatic; where Constantine, the son of Constantine the Great, fighting against Constans his brother, lost his life.

ALSACE, a province of France, bounded on the east by the Rhine, on the south by Swisserland, on the west by Lorrain, and on the north by the palatinate of the Rhine. It was formerly a part of Germany, but was given to France by the treaty of Munster. It is one of the most fruitful and plentiful provinces of Europe, abounding in corn, wine, wood, flax, tobacco, pulse, fruits, &c. The mountains which divide it from Lorrain are very high; and generally covered with fir, beech, oak, and horn-beam. Those on the side of Swisserland are less high; and furnished with all sorts of wood,

Alquier
||
Alface.

Alsen
||
Alfine.

wood, as well for fuel as building. The country itself is diversified with rising hills and fertile vales, besides large forests; but that between the rivers Ill, Hart, and the Rhine, as far as Strasburgh, is inferior to the rest, on account of the frequent overflowing of the Rhine. In High Alsace there are mines of silver, copper, and lead. They however work none but those of Giromany, from which are annually drawn 1600 marks of silver, each mark being eight ounces; and 24,000 pounds of copper: but the expence of working them is almost equal to the profit. There are iron-works in several parts of Alsace, and particularly at Betford. There is a mineral spring at Sultzbach, near Munster, in High Alsace; which is in great reputation for the palsy, weakness of the nerves, and the gravel.—The original inhabitants of Alsace are honest and good-natured, but wedded to their own manners and customs. The fruitfulness of their country renders them indolent and inactive; for the Swiss make their hay and reap their corn, as well as manage the vintage of High Alsace, which sends a great deal of money out of the province. The common language is the German: however, the better sort of people speak French in the towns; and even in the country, they speak French well enough to be understood.

ALSEN, an island of Denmark in the lesser Belt, or entrance into the Baltic sea, between Sleswick and Funen. It is remarkable for nothing except two castles, and producing large crops of aniseeds, a carminative much used in seasoning the food and mixing with the bread all over the Danish dominions. E. Long. 10. 12. N. Lat. 55. 12.

ALSFIELD, a town of Germany, in the landgraviate of Hesse Cassel, ten miles north-west of Marburg, and 35 south of Hesse Cassel. It is an ancient town, and well-built; and the inhabitants were the first of this country who embraced the Reformation. E. Long. 9. 5. N. Lat. 50. 40.

ALSHASH, a very beautiful city in Buckharia, supposed to be the same with that which is now called *Tashcant*, the capital of the eastern part of Turkestan, possessed by the Kassats. It is situated on the river *Sihun*, now *Sir*, and had a well-watered garden for every house; but was ruined by Jenghiz Khan, who took the city, and caused a great number of its inhabitants to be massacred.

ALSHEDA, a parish of Sweden, in the province of Smaland, where a gold mine was discovered in 1738.

ALSINA, in botany, a synonyme of the theligonum. See THELIGONUM.

ALSINASTRUM, in botany, the trivial name and also a synonyme of the elatine. See ELATINE.

ALSINE, or CHICKWEED: A genus of the trigynia order, belonging to the pentandria class of plants; and, in the natural method, ranking under the 22d order, *Caryophyllei*. The characters are: The *calyx* is quinquephyllous; The *corolla* consists of five equal petals, longer than the calyx: The *stamina* consist of five capillary filaments; the antheræ are roundish: The *pistillum* has an oval germen, three filiform styli, and obtuse stigmata: The *pericarpium* is an ovate unilocular capsule, with three valves: The *seeds* are roundish and numerous. Of this genus a great number of species are enumerated by some botanical writers; but none

of them possess any remarkable properties, except the media, or common chickweed, with white blossoms, which is so well known as to need no particular description.—This species affords a notable instance of what is called the *sleep of plants*; for, every night, the leaves approach in pairs, so as to include within their upper surfaces the tender rudiments of the new shoots; and the uppermost pair but one at the end of the stalk are furnished with longer leaf-stalks than the others; so that they can close upon the terminating pair, and protect the end of the branch. The young shoots and leaves, when boiled, can hardly be distinguished from spring spinach. They are deemed refrigerating and nutritive, and an excellent food for persons of a consumptive habit of body.—Swine are extremely fond of chickweed; cows and horses eat it; sheep are indifferent to it; and goats refuse it.

ALSIRAT, in the Mahometan theology, denotes a bridge laid over the middle of hell, finer than a hair, and sharper than the edge of a sword, over which people are to pass, after their trial, on the day of judgement. To add to the difficulty of the passage, Mahomet assures, that the alsirot, narrow as it is, is beset with briars and thorns; none of which, however, will be any impediment to the good, who shall fly over it like the wind; Mahomet and his mussulmen lead the way; whereas the wicked, by the narrowness of the path, the entangling of the thorns, and extinction of the light which directed the former to paradise, will soon miss their footing, and tumble headlong into hell, which is gaping beneath to receive them.

ALSIUM, a city of ancient Etruria, occupying (according to Cluverius) the spot on which *Pala* now stands. We are told by Dionysius Halicarnassensis, that Alsiun was built by the Aborigines, long before the Tyrsenians invaded Italy. In this case it must have been founded not long after the dispersion in the days of Peleg. Its founder is said to have been one *Alesus*, *Alesus*, or *Alisa*; whom some conjecture to have been Alifah, or Elifha, the son of Javan, mentioned in scripture.

ALSOP, (Anthony), a divine and poet, was educated at Westminster-school, and thence elected to Christ-church, Oxford, where he took the degree of M. A. in March 1696, and of B. D. in Decem. 1706. On his coming to the university, he was very soon distinguished by Dean Aldrich, and published *Fabularum Æsopicarum Delectus*, Oxon. 1698, 8vo, with a poetical dedication to Lord Viscount Scudamore, and a preface in which he took part against Dr Bentley in the famous dispute with Mr Boyle. He passed through the usual offices in his college to that of censor with considerable reputation; and for some years had the principal noblemen and gentlemen belonging to the society committed to his care. In this employment he continued till his merit recommended him to Sir Jonathan Trelawney, bishop of Winchester, who appointed him his chaplain, and soon after gave him a prebend in his own cathedral, together with the rectory of Brightwell in the county of Berks, which afforded him ample provision for a learned retirement, from which he could not be drawn by the repeated solicitations of those who thought him qualified for a more public character and a higher station. In 1717 an action was brought against him by Mrs Elisabeth Astrey of Oxford, for a breach.

Alsirot
||
Alsiop.

Alfop. breach of a marriage-contract; and a verdict obtained against him for 2000l. which probably occasioned him to leave the kingdom for some time. His death, which happened June 10. 1726, was occasioned by his falling into a ditch that led to his garden-door. A quarto volume was published in 1752, under the title of *Antourii Alfopi, Ædis Christi olim Alumui Odarum libri duo*. Four English poems of his are in Doddsley's Collection, one in Pearch's, several in the early volumes of the Gentleman's Magazine, and some in "The Student." Mr Alfop is respectfully mentioned by the facetious Dr King of the Commons (vol. I. p. 236), as having enriched the commonwealth of learning, by "Translations of Fables from Greek, Hebrew, and Arabic;" and not less detractingly by Dr Bentley, under the name of "Tony Alfop, a late editor of the Æsopian Fables."

ALSOP (Vincent), an eminent divine, was educated in St John's college in Cambridge, where he took the degree of Master of Arts. He received deacon's orders from a bishop, after which he went down into Rutlandshire, and settled at Oakham, where he was an assistant to the master of the free-school. As he was a man of a sprightly turn, he fell there into indifferent company; but was reclaimed by the frequent admonitions of the reverend Mr Benjamin King. He afterwards married that gentleman's daughter, and becoming a convert to his principles, received ordination in the Presbyterian way, not being satisfied with that which he had from the bishop. He was settled at Wilbee in the county of Northampton, whence he was ejected in 1662, for nonconformity. After this he ventured to preach sometimes at Oakham, and at Wellingborough where he lived, and was once six months in prison for praying by a sick person. A book he wrote against Dr Sherlock in a humorous style, made him well known to the world, and induced Mr Cawton, an eminent nonconformist in Westminster, to recommend him to his congregation for his successor. On receiving this call he quitted Northamptonshire and came to London, where he preached constantly, and wrote several pieces which were extremely well received by the public. His living in the neighbourhood of the court exposed him to many inconveniences; but these ended with the reign of Charles II. or at least in the beginning of the next reign, when Mr Alfop's son engaging in treasonable practices was freely pardoned by king James. After this our divine went frequently to court, and is generally supposed to have been the person who drew the Presbyterian's address to that prince for his general indulgence. After the Revolution, Mr Alfop gave very public testimonies of his affection for the government; yet upon all occasions he spoke very respectfully of king James, and retained a very high sense of his clemency in sparing his only son. The remainder of his life he spent in the exercise of his ministry, preaching once every Lord's day; besides which he had a Thursday lecture, and was one of the lecturers at Pinner's hall. He lived to be a very old man, and preserved his spirits to the last. On grave subjects he wrote with a becoming seriousness; but where wit might properly be shown, he displayed his to great advantage. His funeral sermon was preached by Mr Slater, and his memory will be always preserved by his own learned

and elegant writings. Of these the most remarkable, besides his sermons, are, 1. *Antifozzo*; in vindication of some great truths opposed by Dr William Sherlock, 8vo, 1675. 2. *Melius Inquirendum*; in answer to Dr Goodman's Compassionate Inquiry, 8vo, 1679. 3. The Mischief of Impositions; in answer to Dr Stillingfleet's Mischief of Separation, 1680. 4. A Faithful Re-proof to a False Report, with reference to the Differences among the United Ministers in London, 8vo.

ALSTEDIUS, (John-Henry), a German Protestant divine, and one of the most indefatigable writers of the 17th century. He was some time professor of philosophy and divinity at Herborn in the county of Nassau: from thence he went into Transylvania, to be professor at Alba Julia; where he continued till his death, which happened in 1638, being then 50 years of age. His *Encyclopedia* has been much esteemed even by the Roman Catholics; it was printed at Lyons, and sold very well throughout all France. His *Thesaurus Chronologicus* is by some esteemed one of his best works, and has gone through several editions. He also wrote *Triumphus Biblicus*, to show that the principles of all arts and sciences are to be found in the scriptures; but he gained very few to his opinion. He was a Millennarian; and published, in 1627, a treatise *De mille annis*, in which he asserted that the reign of the saints on earth was to begin in 1694.

ALSTON-MORE, a town in Cumberland, seated on a hill, at the bottom of which runs the river Tyne, with a stone bridge over it. Near this place is plenty of lead ore. W. Long. 2. 4. N. Lat. 54. 45.

ALSTONIA, in botany; a genus of the monogynia order, belonging to the hexandria class of plants. The characters are: The *calyx* is a perianthium beneath, imbricated: The *corolla* is monopetalous, and shorter than the calyx; the border expanding, eight or ten parted, with alternate divisions: The *stamina* consist of numerous short filaments, the exterior ones longer; the antheræ are orbicular and furrowed: The *pistillum* has a small ovate germen above; a simple stylus the length of the corolla, filiform and erect; the stigma inverse egg-headed. There is but one species, the theaformis, a native of America.

ALSTROEMERIA, in botany: A genus of the monogynia order belonging to the hexandria class of plants; and, in the natural method, ranking under the 11th order, *Sarmentaceæ*. The characters are: There is no *calyx*: The *corolla* is nearly bilabiate; and consists of six petals, the two inferior tubular at the base: The *stamina* consist of six subulated filaments, declining and unequal; the antheræ oblong: The *pistillum* has an hexangular germen beneath; the stylus declining, filiform, the length of the stamina; and three oblong bifid stigmata: The *pericarpium* is a roundish hexangular capsule, with three cells and three valves: The seeds are globular and numerous. There are five species, natives of Italy and Peru.

ALT, in music, a term applied to the high notes in the scale.

ALTAIC CHAIN, a range of mountains which bounds Asia on the south. It begins at the vast mountain Bogdo, passes above the head of the Irtysh, and then takes a course rugged, precipitous, clothed with snow, and rich in minerals, between the Irtysh and

Altamont Ob; then proceeds by the lake Telezkoi, the rise of the Ob; after which it retires, in order to comprehend the great rivers which form the Jenesei, and are locked up in these high mountains; finally, under the name of the *Sainnes*, is uninterruptedly continued to the lake of Baikal. A branch insinuates itself between the sources of the rivers Onon and Ingoda, and those of Ichikoi, accompanied with very high mountains, running without interruption to the north-east, and dividing the river of Amur, which discharges itself into the east, in the Chinese dominions, from the river Lena and lake Baikal. Another branch stretches along the Olecma, crosses the Lena below Jakoutsk, and is continued between the two rivers Tongouska to the Jenesei, where it is lost in wooded and morassy plains. The principal chain, rugged with sharp-pointed rocks, approaches and keeps near the shores of the sea of Ockhozt, and passing by the sources of the rivers Outh, Aldan, and Maia, is distributed in small branches, which range between the eastern rivers which fall into the Icy Sea; besides two principal branches, one of which, turning south, runs through all Kamtschatka, and is broken, from the cape Lopatka, into the numerous Kurile isles, and to the east forms another marine chain, in the islands which range from Kamtschatka to America; most of them, as well as Kamtschatka itself, distinguished by fierce volcanoes, or the traces of volcanic fires. The last chain forms chiefly the great cape Tschutski, with its promontories and rocky broken shores.

ALTAMONT, a very handsome town of Italy, in the kingdom of Naples, and in Calabria Citerior, 15 miles north-west of Basigliano. E. Long. 16. 22. N. Lat. 39. 40.

ALTAMURA, a town of Naples, in the territory of Bari, with the title of a principality, seated on the foot of the Apennine mountains. E. Long. 16. 54. N. Lat. 41. 0.

ALTAR, a place upon which sacrifices were anciently offered to some deity.

The heathens at first made their altars only of turf; afterwards they were made of stone, of marble, of wood, and even of horn, as that of Apollo in Delos.

Altars differed in figure as well as in materials. Some were round, others square, and others triangular. All of them were turned towards the east, and stood lower than the statues of the gods; and were generally adorned with sculpture, representing either the gods to whom they were erected, or their symbols. See the **PAGAN ALTARS** represented on Plate XI. Upon the sides of N° 1. a trident and two dolphins are exhibited, which denote it to have been dedicated to Neptune. N° 2. a four-square altar, was dedicated to the nymphs, as the inscription imports. N° 3. exhibits a Bacchanal holding a thyrsus in his hand, a mark of the altar's being built to Bacchus: it had two other sides, which made it appear triangular. Of N° 4. which was also triangular, each face or side exhibited a genius, one of whom (on the side represented) carries an oar upon his neck, which seems to denote it an altar of Neptune. N° 5. an altar of a round shape, is inscribed *Ara Neptuni*: the god himself is there represented, all naked, saving the pallium upon his shoulder; and holding in his left hand a trident, and in his right a dolphin.

The height of altars also differed according to the

VOL. I. Part II.

different gods to whom they sacrificed. According to Servius, those altars set apart for the honour of the celestial gods, and gods of the higher class, were placed on some pretty tall pile of building; and for that reason were called *altaria*, from the words *alta* and *ara*, "a high elevated altar." Those appointed for the terrestrial gods were laid on the surface of the earth, and called *aræ*. And, on the contrary, they dug into the earth and opened a pit for those of the infernal gods, which they called *βοθροὶ λακκοί*, "scrobiculi." But this distinction is not every where observed: the best authors frequently use *ara* as a general word, under which are included the altars of the celestial and infernal, as well as those of the terrestrial, gods. Witness Virgil, Ecl. 5.

—*En quatuor aras,*

Where *aræ* plainly includes *altaria*; for whatever we make of Daphnis, Phœbus was certainly a celestial god. So Cicero, pro Quint. *Aras delubraque Hecates in Græcia vidimus*. The Greeks also distinguished two sorts of altars; that whereon they sacrificed to the gods was called *βωμος*, and was a real altar, different from the other whereon they sacrificed to the heroes, which was smaller, and called *εσχαρα*. Pollux makes this distinction of altars in his *Onomasticon*; he adds, however, that some poets used the word *εσχαρα* for the altar whereon sacrifice was offered to the gods. The Septuagint version does sometimes also use the word *εσχαρα* for a sort of little low altar, which may be expressed in Latin by *craticula*; being a hearth rather than an altar.

Before temples were in use, altars were erected sometimes in groves, sometimes in the highways, and sometimes on the tops of mountains; and it was a custom to engrave upon them the name, ensign, or character, of the deity to whom they were consecrated.

In the great temples of ancient Rome there were ordinarily three altars: The first was placed in the sanctuary, at the foot of the statue of the divinity, upon which incense was burnt and libations offered; the second was before the gate of the temple, and upon it they sacrificed the victims; and the third was a portable altar, upon which were placed the offering and the sacred vessels.

Besides these uses of altars, the ancients swore upon them, and swore by them, in making alliances, confirming treaties of peace, and other solemn occasions. Altars also served as places of refuge to all those who fled to them, whatever crime they had committed.

Altars are doubtless as ancient as sacrifices themselves; consequently their origin is not much later than that of the world; Gen. ch. iv. Some attribute their origin to the Egyptians; others to the Jews; others to the patriarchs before the flood. Some carry them as far back as Adam, whose altar is much spoken of by Jewish, and even Christian writers. Others are contented to make the patriarch Enoch the first who consecrated a public altar. Be this as it will, the earliest altars we find any express testimony of are those erected by Abraham.

Altars, in the patriarchal times, were very rude. The altar which Jacob set up at Beth-el was nothing but a stone, which served him instead of a bolster; that of Gideon, a stone before his house: and the first which

Altar. God commanded Moses to erect was probably of earth, or unpolished stones, without any iron; for if any use was made of that metal, the altar was declared impure.

The principal altars of the Jews were, The altar of incense; that of burnt-offering; and the altar, or table, for the shew-bread.

The altar of incense was a small table of shittim-wood, covered with plates of gold, of one cubit in length, another in width, and two in height. At the four corners, were four kinds of horns, and all round a little border or crown over it. This was the altar hidden by Jeremiah before the captivity; and upon it the officiating priest offered, every morning and evening, incense of a particular composition. See Plate XI.

The altar of burnt-offerings was made of shittim-wood, and carried upon the shoulders of the priests by staves of the same wood overlaid with brass. In the time of Moses, this altar was five cubits square and three high; but in Solomon's temple it was much larger, being 20 cubits square and 10 in height. It was covered with brass; and at each corner was a horn or spire, wrought out of the same wood with the altar, to which the sacrifices were tied. Within the hollow was a grate of brass, on which the fire was made; through it fell the ashes, and were received in a pan below. At the four corners of the grate were four rings and four chains, which kept it up at the horns. This altar was placed in the open air, that the smoke of the burnt-offerings might not sully the inside of the tabernacle. See Plate XI.

The altar, or table, for the shew-bread, was likewise of shittim-wood, covered with plates of gold, having a little border round it, adorned with sculpture. It was two cubits long, one wide, and one and an half in height. Upon this table, which stood in the holy of holies, were put, every Sabbath-day, 12 loaves, with salt and incense.

The Jewish altars, after their return from the captivity, and the building of the second temple, were in some respects different from those described above. That of burnt-offerings was a large pile, built of unhewn stone, 32 cubits square at the bottom, and 24 square at the top. The ascent was by a gentle rising, 32 cubits in length, and 16 in breadth.

ALTAR, is also used among Christians for the communion-table.

In the primitive church, the altars were only of wood; as being frequently to be removed from place to place. But the council of Paris, in 509, decreed that no altar should be built but of stone.—At first there was but one altar in each church; but the number soon increased; and from the writings of Gregory the Great, who lived in the sixth century, we learn, that there were sometimes in the same church 12 or 13. In the cathedral of Magdeburg there are no less than 49 altars.

The altar is sometimes sustained on a single column, as in the subterraneous chapels of St Cecilia, at Rome, &c.; and sometimes by four columns, as the altar of St Sebastian of Crypta Arenaria; but the customary form is, to be a massive of stone-work, sustaining the altar-table. These altars bear a resemblance to tombs:

to this purpose, we read in church-history, that the Altar-thane primitive Christians chiefly held their meeting at the tombs of the martyrs, and celebrated the mysteries of religion upon them; for which reason, it is a standing rule to this day in the church of Rome, never to build an altar, without inclosing the relics of some saint in it.

ALTAR-THANE, or ALTARIST, in old law-books, an appellation given to the priest or parson of a parish, to whom the altarage belonged. See ALTARAGE.

ALTARAGE, in law, altars erected in virtue of donations, before the Reformation, within a parochial church, for the purpose of singing of mass for deceased friends.

ALTARAGE likewise signifies the profits arising to the priest on account of the altar.

AL-TAYEFF, a town of Hejaz, a district of Arabia Felix. It is situated about 60 miles east of Mecca, behind mount Gazwan, where the cold is more intense than in any other part of the district, but the air very wholesome. Its territory abounds in fountains, and produces excellent raisins. The town is surrounded with a wall, but is not very large.

ALTDORF, a large handsome town in Switzerland, and the chief of the canton of Uri. It is situated below the lake of the four cantons, in a plain, at the foot of a mountain, whose passages are difficult, and serve instead of fortifications. It has four churches and two convents; St Martin's church and that of the Holy Cross are the finest. The town-house and the arsenal are also worth seeing. E. Long. 8. 30. N. Lat. 46. 50.

ALTEA, a sea-port town of Valencia, in Spain. It was taken in 1705, in favour of the archduke Charles; but lost after the battle of Almanza. W. Long. 0. 15. N. Lat. 46. 34.

ALTEMBURG, a town of Transylvania, 17 miles S. W. of Wisemburg, and 35. S. of Clausenbourg. E. Long. 23. 5. N. Lat. 46. 25.

ALTENA, a sea-port town of Germany, in the duchy of Holstein, in Lower Saxony. It is a modern town, built by the king of Denmark, and was burnt by the Swedes in 1712; but has since been beautifully re-built. The merchandise brought from Asia, by the Danish East-India company, is sold here. E. Long. 10. 0. N. Lat. 53. 51.

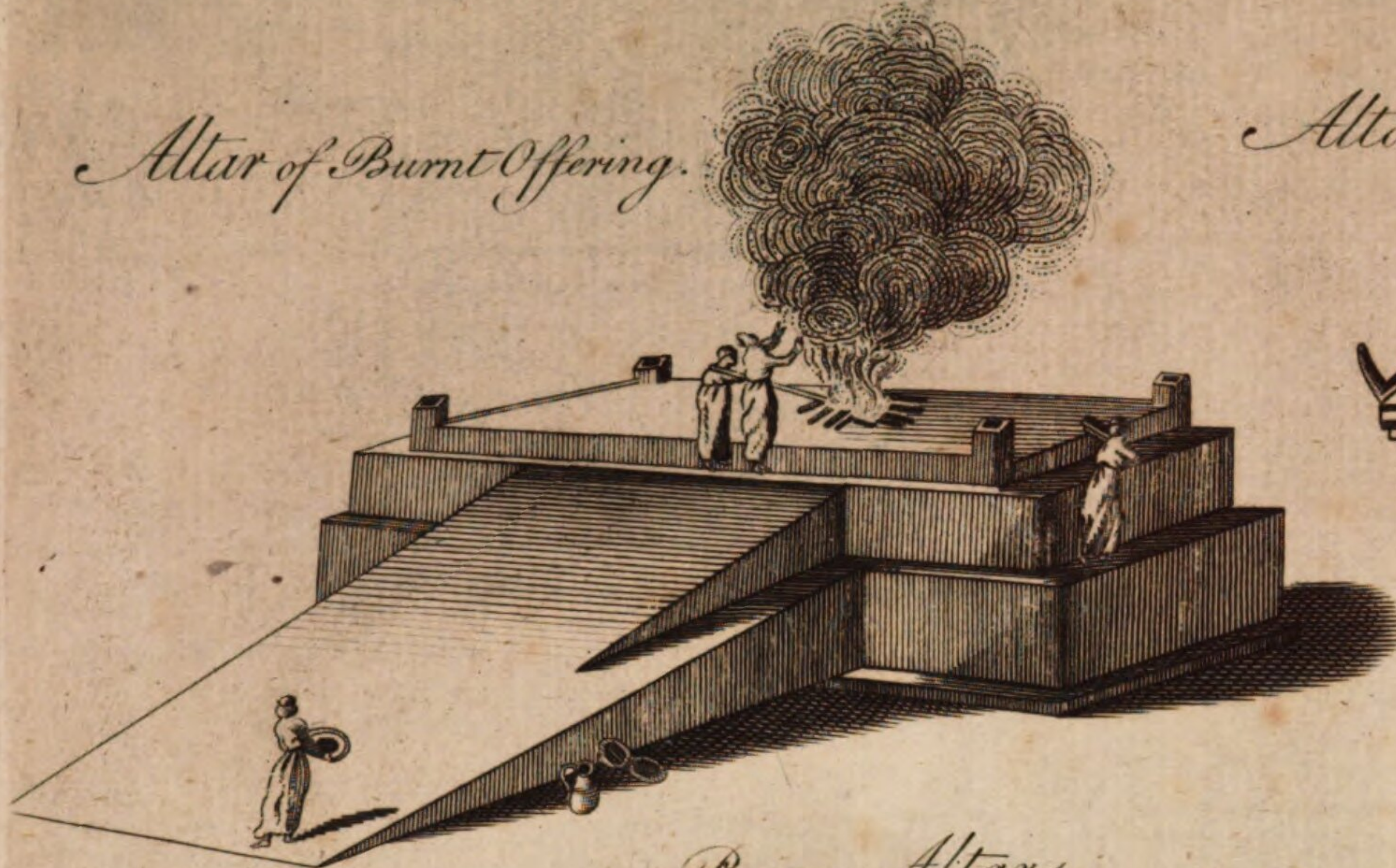
ALTENBERG, an ancient town of Germany, situated on the river Pleiss, with a good castle placed on a rock, in Misnia, in the circle of the Upper Saxony. It was formerly an Imperial city, but at present belongs to the house of Saxony. Here is a college which has always been in a flourishing condition. In 1705, there was a nunnery founded for women of a high rank, who are Protestants. E. Long. 15. 8. N. Lat. 50. 59.

ALTENBURG, a small fortified town of Hungary, in the territory of Moson, near the Danube, about 55 miles from Vienna. E. Long. 35. 30. N. Lat. 48. 15.

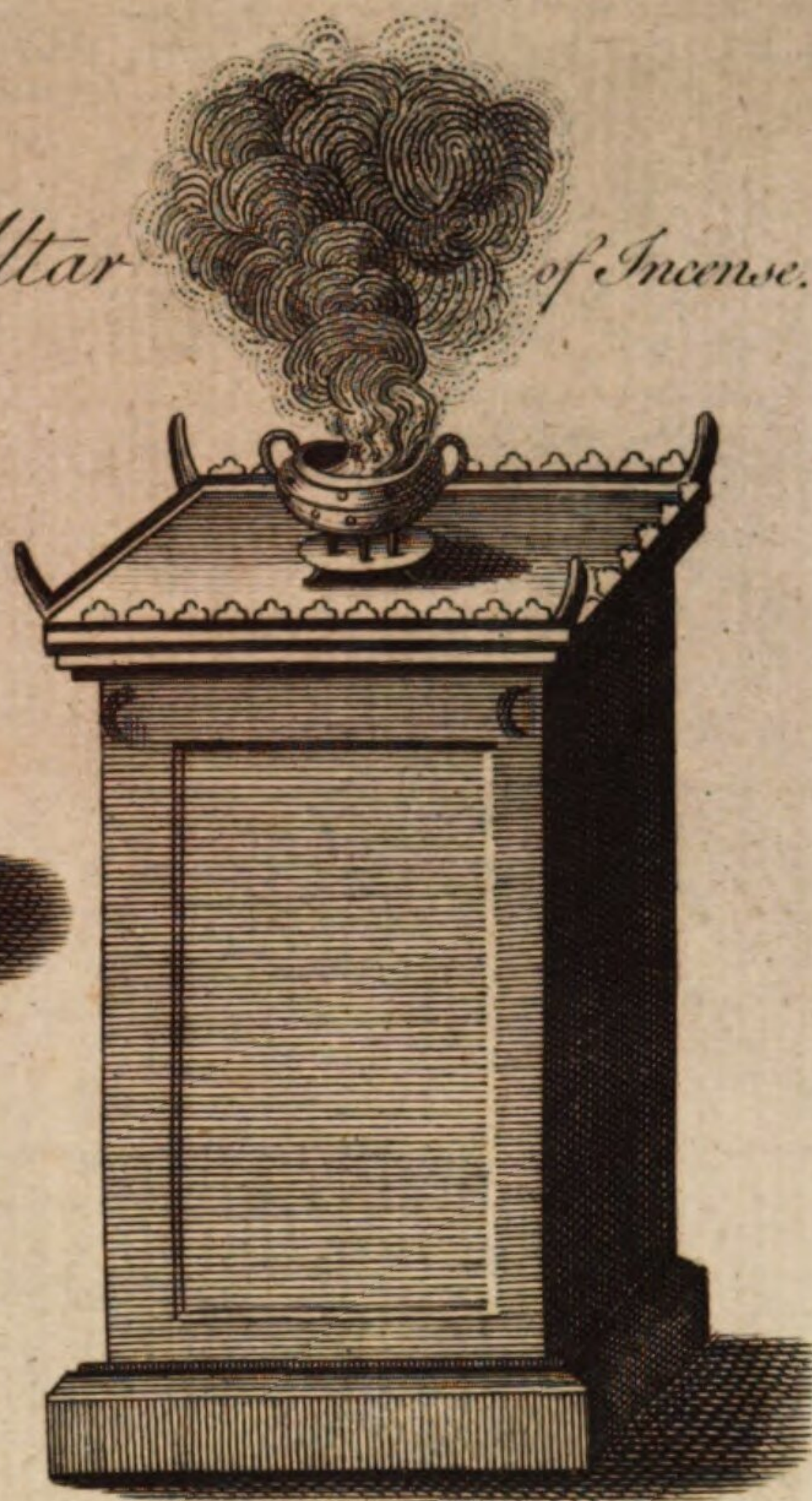
ALTENBURG, or OWAR, a small but strong town of Hungary, seated in a marsh, with wide streets. It is near the river Danube, and is surrounded with deep ditches. It is 15 miles south of Presburg, 40 south-east of Vienna, and 65 south-west of Buda. E. Long. 17. 56. N. Lat. 44. 0.

ALTE-

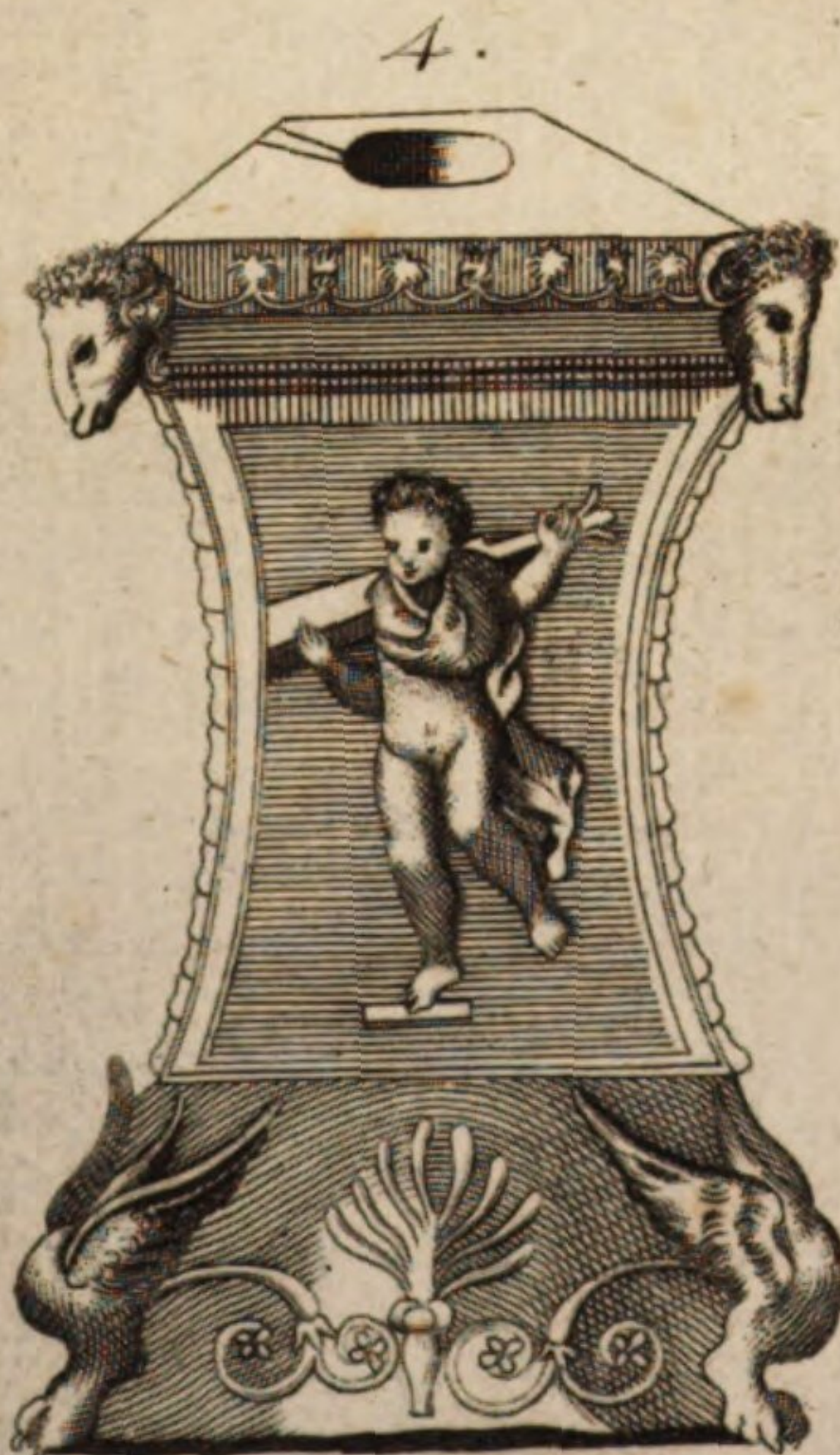
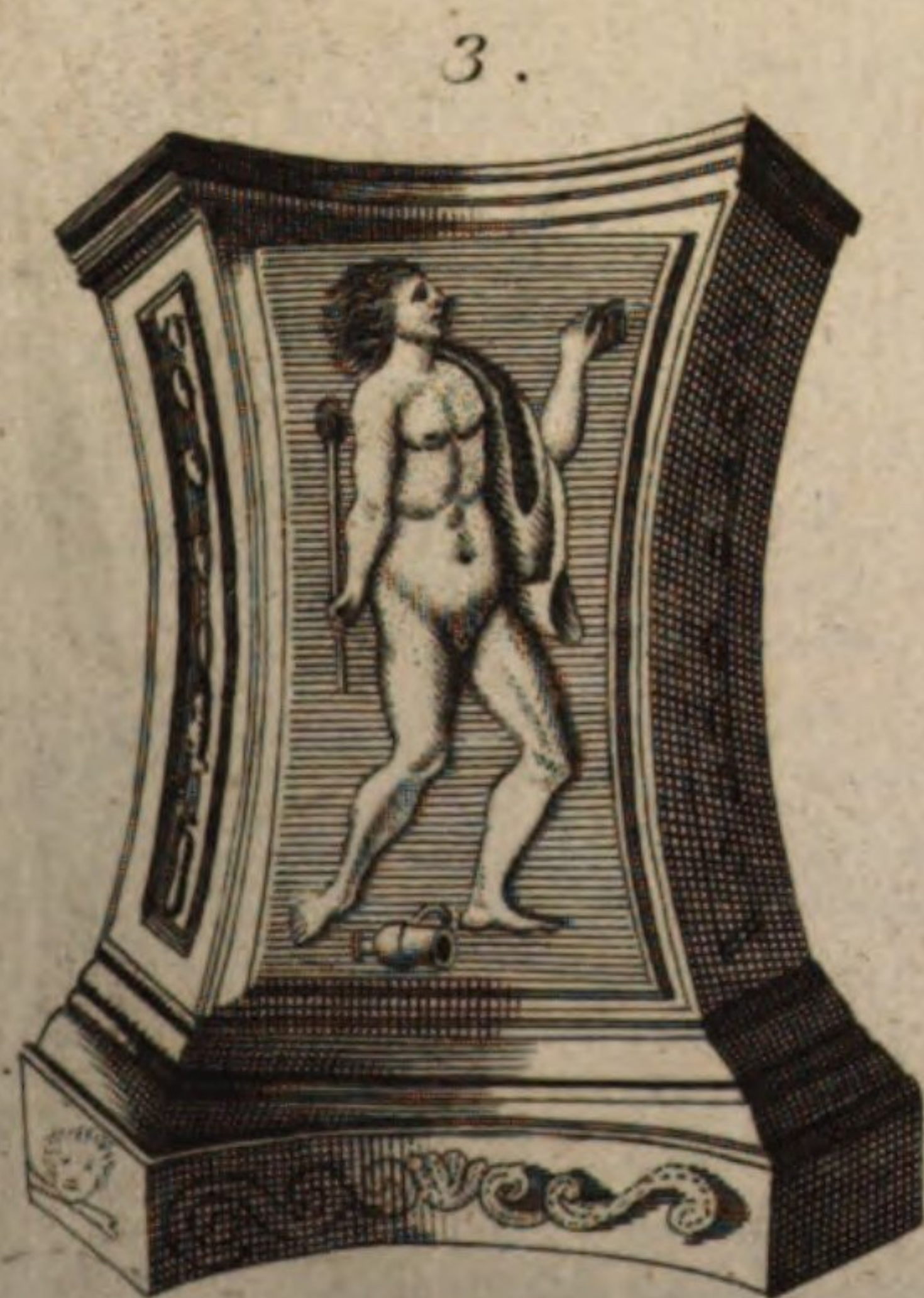
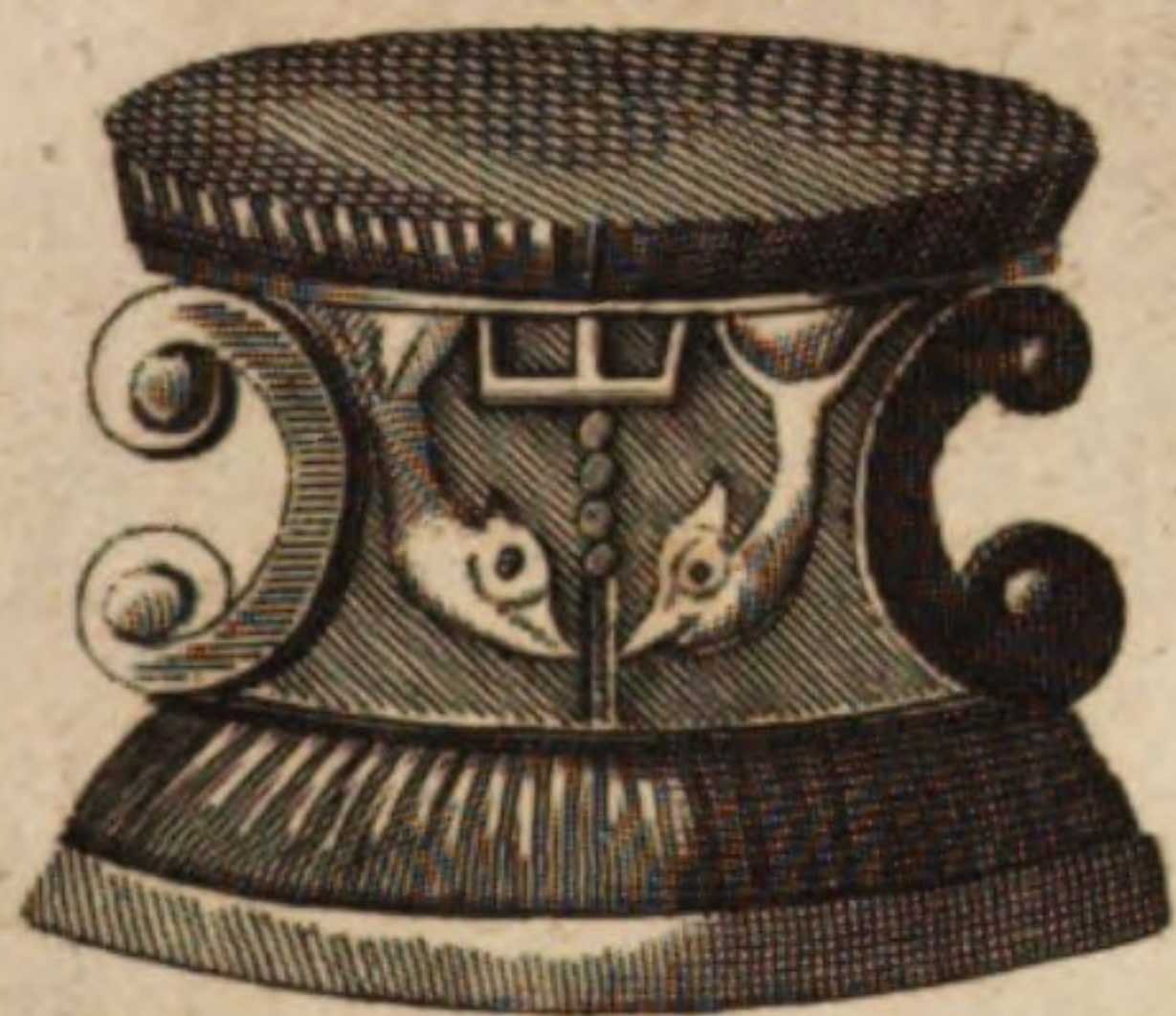
Altar of Burnt Offering.



Altar of Incense.



Pagan Altars.



Alterants.

Althæa.

ALTERANTS, or *ALTERATIVE Medicines*, such as correct the bad qualities of the blood and other humours, without occasioning any sensible evacuation.

ALTERATION, in physics, the act of changing the circumstances and manner of a thing; its general nature and appearance remaining the same. Or, it is an accidental and partial change in a body; without proceeding so far as to make the subject quite unknown, or to take a new denomination thereupon.—Or, it may be defined, the acquisition or loss of such qualities as are not essential to the form of the body. Thus, a piece of iron, which before was cold, is said to be *altered*, when it is made hot; since it may still be perceived to be iron, is called by that name, and has all the properties thereof. By this *alteration* is distinguished from *generation* and *corruption*; those terms expressing an acquisition or loss of the essential qualities of a thing.—The modern philosophers, after the ancient chemists and corpuscularians, hold all *alteration* to be effected by means of local motion. According to them, it always consists either in the emission, accession, union, separation, or transposition, of the component particles.

ALTERCATION, a debate or contest between two friends or acquaintance. The word comes from *altercari*, which anciently signified to converse or hold discourse together.—Thus, we say, They never come to an open quarrel, but there is continually some little *altercation* or other.

ALTERN-BASE, in trigonometry, a term used in contradistinction to the true base. Thus in oblique triangles, the true base is either the sum of the sides, and then the *difference* of the sides is called the *altern-base*; or the true base is the difference of the sides, and then the *sum* of the sides is called the *altern-base*.

ALTERNATE, in a general sense, a term applied to such persons or things as succeed each other by turns. Thus, two who command each his day, are said to have an alternate command, or to command alternately.

ALTERNATE, in heraldry, is said in respect of the situation of the quarters. Thus the first and fourth quarters, and the second and third, are usually of the same nature, and are called *alternate quarters*.

ALTERNATE, in botany, when the leaves or branches of plants arise higher on opposite sides alternately.

ALTERNATION, in its primary sense, denotes a succession by turns.

ALTERNATION, is sometimes used to express the different changes or alterations of orders in any number of things proposed. This is also called *permutation*, &c. and is easily found by a continual multiplication of all the numbers, beginning at unity. Thus, if it be required to know how many changes or alternations can be rung on six bells, multiply the numbers 1, 2, 3, 4, 5, 6, continually into one another; and the last product gives the number of changes.

ALTERNATIVE, is particularly used for the choice of two things proposed. In this sense we say, to take the *alternative* of two propositions.

ALTHÆA, MARSHMALLOW: A genus of the polyandria order, belonging to the monodelphia class of plants; and, in the natural method, ranking under the 37th order, *Columnifera*. The characters are: The *calyx* is a double perianthium, the exterior one nine-cleft:

The *corolla* consists of five petals, coalesced at the base: The *filamina* consists of numerous filaments inserted into the corolla; the antheræ are kidney-shaped. The *pistillum* has an orbicular germen; a short cylindrical stylus; and numerous bristly stigmata, the length of the stylus: The *pericarpium* consists of numerous arillæ. The *seeds* are solitary, and kidney-shaped. There are three

Althæa.

Species. 1. The vulgaris, or common marshmallow, is a native of Britain, and hath a perennial root, and an annual stalk, which perishes every autumn. The stalks grow erect to the height of four or five feet. These are garnished with leaves, which are hoary, soft to the touch, and placed alternately on the branches. The flowers come out from under the wings of the leaves, like the mallow, and are of a purplish white. 2. The hirsuta, or hairy marshmallow, is a native of Spain and Portugal. It is a low plant, whose branches trail on the ground, unless they are supported by stakes. The leaves and stalks are beset with strong hairs, the flowers come out like those of the common sort, but are smaller, and have purplish bottoms. 3. The cannabina, or shrubby marshmallow, is a native of Hungary, and Istria. It has a woody stem, which rises to the height of four or five feet; and puts out many side-branches. The flowers come out in the same manner as in the others, but are of a deeper red colour. This sort seldom flowers the first year, unless the summer proves warm; but when the plants live through the winter, they will flower early in the following summer, and produce good seeds.

Culture. Though the first sort is found naturally in salt marshes, it will thrive when transplanted into any soil, or in any situation; however, it will always grow larger in moist than in dry soil. It may be propagated either by parting the roots in autumn when the stalks decay, or by sowing the seeds in the spring. If the seeds of the second species are sown in April, the plants will flower in July, and carry ripe seed in September. They ought to be sown in the places where they are to remain, as the roots shoot deep in the ground; so that unless the plants are removed very young, they seldom survive it. The seeds of the cannabina ought also to be sown where the plants are to remain, for the reason just now given. They should have a sheltered situation and a dry soil, otherwise they will not live through the winter. Indeed they seldom continue in this country above two years, with all the care that can be taken of them.

Medicinal Uses. The first is the only species used in medicine. The whole plant, especially the root, abounds with a mild mucilage. It has the general virtues of an emollient medicine; and proves serviceable in a thin acrimonious state of the juices, and where the natural mucus of the intestines is abraded. It is chiefly recommended in sharp defluxions upon the lungs, hoarseness, dysenteries; and likewise in nephritic and calculous complaints: not, as some have supposed, that this medicine has any peculiar power of dissolving or expelling the calculus; but as, by lubricating and relaxing the vessels, it procures a more free and easy passage. The root is sometimes employed externally for softening and maturing hard tumours; chewed, it is said to give ease in difficult dentition of children.

This root gave name to an officinal syrup, decoction,

Althæa
||
Alting.

tion, and ointment; and was likewise an ingredient in the compound powder of gum tragacanth and the oil and plaster of mucilages. But of all these formulæ the syrup alone is now retained.

ALTHÆA Frutex. See HIBISCUS.

ALTIMETRY, the art of measuring altitudes or heights, whether accessible or inaccessible. See GEOMETRY.

ALTIN, a money of account in Muscovy, worth three *copecks*; one hundred of which make a ruble, worth about 4 s. 6 d sterling.

ALTIN, a lake in Siberia, from whence issues the river Ob, or Oby, in N. Lat. 52. 0. E. Long. 85°. 55'. This lake is called by the Russians *Teloskoi Osero*, from the Teleffi, a Tartarian nation, who inhabit the borders of it, and who give it the name of *Altin-Kul*. By the Calmucks it is called *Altinnor*. It is near ninety miles long and 50 broad, with a rocky bottom. The north part of it is sometimes frozen so hard as to be passable on foot, but the southern part is never covered with ice. The water in the Altin lake, as well as in the rivers which run through the adjacent places, only rises in the middle of summer, when the snows on the mountains are melted by the heat of the sun.

ALTINCAR, among mineralists, a species of facitious salt used in the fusion and purification of metals.

The altincar is a sort of flux powder. Divers ways of preparing it are given by Libavius.

ALTING (Henry), professor of divinity at Heidelberg and Groningen, was born at Embden in 1583, of a family which had been long conspicuous in Friseland. His father, Menso Alting, was the first, who, with two others, preached the reformation in the territory of Groningen, about the year 1566, under the tyrannical government of the duke of Alva; and the first that preached in the great church of Groningen, after the reduction of that town by the States General in 1594. Henry was chosen, in 1605, preceptor to the three young counts of Nauffau, Solms, and Izenberg. After various difficulties, he settled at Groningen, where he continued till his death, August 25. 1644. He was a sound protestant divine, a pious Christian, a useful member of society in many respects, and one who suffered much for the truth. Most of his works were never published; those which have been are the following: *Notæ in decadem problematum J. Behm*, 1618. *Loci communes explicatio catecheseos Palatinae*, 1646, in 3 vols. *Exegesis Augustanae confes.* 1647. *Methodus Theologiae*, 1650. It appears from the catalogue of his works annexed to his life, that the *Medulla hist. prophane*, published by Dr Pareus, was composed by Alting. The most remarkable piece among Alting's MSS. is, The ecclesiastical history of the Palatinate, from the reformation to the administration of John Casimir.

ALTING (James), son of the former, was born at Heidelberg in 1618. He travelled into England in 1640, where he was ordained by the learned Dr Prideaux, bishop of Worcester. He afterwards accepted of the professorship of Groningen, vacant by the death of Gomarus; but his situation was rendered very disagreeable by the continual disputes which he had with his colleague Sam. des Marets, who favoured the school-divinity. He died in 1697. He recommended the edition of his works to Menso Alting (author of *Notitia*

German. Infer. Antiquæ, fol. Amst. 1679); but they were published in 5 vols folio, with his life, by Mr Bekker of Amsterdam. They contain various analytical, exegetical, practical, problematical, and philosophical tracts, which show his great industry and knowledge. Alting was a divine greatly addicted to the text of the scripture, to Cocceianism, and Rabbinism. He preached well in German, Dutch, and English.

ALTITUDE, accessible, and inaccessible. See GEOMETRY.

The method of taking considerable terrestrial altitudes, of which those of mountains are the greatest, by means of the barometer, is very easy and expeditious. It is done by observing, on the top of the mountain, how much the mercury has fallen below what it was at the foot of the mountain. See BAROMETER.

ALTITUDE of the Eye, in perspective, is a right line let fall from the eye, perpendicular to the geometrical plane.

ALTITUDE, in astronomy, is the distance of a star, or other point, in the mundane sphere, from the horizon.

This altitude may be either *true* or *apparent*.—If it be taken from the rational or real horizon, the altitude is said to be true or real; if from the apparent or sensible horizon, the altitude is apparent.—Or rather, the apparent altitude is such as it appears to our observation; and the *true* is that from which the refraction has been subtracted.

The true altitudes of the sun, fixed stars, and planets, differ but very little from their apparent altitudes; because of their great distance from the centre of the earth, and the smallness of the earth's semidiameter, when compared thereto. But the difference between the true and apparent altitude of the moon is about 52'. This subject is further explained under ASTRONOMY.

ALTITUDE Instrument, or Equal Altitude Instrument, is that used to observe a celestial object when it has the same altitude on the east and west sides of the meridian. See ASTRONOMY, the last section.

ALTKIRK, a town of Alsace in Germany, situated on the river Ill, in N. Lat. 47. 40. and E. Long. 7. 15.

ALTMORE, a town of Ireland, in the county of Tyrone, and province of Ulster, situated in N. Lat. 54. 34. and W. Long. 7. 2.

ALTON, a town in Hampshire, seated on the river Wey; W. Long. 0. 46. N. Lat. 51. 5. It is governed by a constable; and consists of about 300 houses, indifferently built, chiefly laid out in one pretty broad street. It has one church, a presbyterian, and a Quaker's meeting, a famous free school, a large manufacture of plain and figured baragons, ribbed druggets, and serges de Nîmes; and round the town is a large plantation of hops.

ALTON, or AVELTON, a village in Staffordshire, five miles north of Utoxeter. There are the ruins of a castle here, which some would have to be built before the Norman conquest; but Dr Plott is pretty certain that it was erected by Theobald de Verdun, in the beginning of the reign of Edward II. A great part of the walls are still standing, but they are in a very ruinous condition.

ALTO *et Basso*, or *in Alto & in Basso*, in law, signifies

Altitude
||
Alto.

Alto signifies the absolute reference of all differences, small and great, high and low, to some arbitrator or indifferent person.—*Pateat universis per presentes, quod Wilhelmus Tylar de Yetton, & Thomas Gower de Almeſtre, poſuerunt ſe in Alto & in Baſſo, in arbitrio quatuor hominum; viz. de quadam querela pendente inter eos in curia.—Nos et terram noſtram altè & baſſè ipſius domini Regis ſuppoſuimus voluntati.*

ALTO-Relievo. See RELIEVO.

ALTO-Repieno, in muſic, the tenor of the great chorus, which ſings and plays only now and then in ſome particular places.

ALTORF, a town of the circle of Franconia, in Germany. It has a phyſic garden, with 2000 different plants; a theatre for diſſections, which has many curioſities in the anatomical way; and a handſome library. It is ſubject to the houſe of Brandenburg; and is ſeated on the confines of Bavaria, 15 miles from Nuremberg. E. Long. 9. 35. N. Lat. 47. 46.

ALT-RANSTADT, a town in Saxony, famous for the treaty between Charles XII. king of Sweden and Auguſtus elector of Saxony, in 1706, wherein the latter reſigned the kingdom of Poland.

ALTRINGHAM, a town of Cheshire in England, upon the borders of Lancashire, ſeven miles from Manchester. W. Long. 1. 30. N. Lat. 53. 25.

ALTZEG, a town of Germany in the Lower Palatinate, the capital of a territory of the ſame name, with an old caſtle. W. Long. 7. 25. N. Lat. 49. 44.

ALVA DE TORMES, a conſiderable town in Spain, in the kingdom of Leon, and territory of Salamanca, with a very handſome caſtle. It is ſeated on the north bank of the river Tormes. W. Long. 6. 1. N. Lat. 41. 0.

ALVAH, the wood wherewith Moſes ſweetened the waters of Marah, Exod. ch. xv. ver. 25.—The name of this wood is not found in ſcripture; but the Mahometans give it that of *alvah*, and pretend to trace its hiſtory from the patriarchs before the flood. Joſephus, on the contrary, ſays, that Moſes uſed the wood which he found next lying before him.

ALVARES DE LUNA, or as ſome call him **ALVARO**, is a character too edifying to be omitted in this work. He was the favourite of John II. king of Caſtile; was famous for the prodigious aſcendency he gained over this prince, and for the puniſhment which at length overtook him. He was natural ſon of Don Alvaro de Luna, lord of Canete in Arragon, and of a woman infamous for unbounded luſt. He was born in 1388, and named Peter; but Antipope Benedict XIII. who was charmed with his wit, tho' yet a child, changed Peter to Alvares. He was introduced to court in 1408, and made a gentleman of the bed-chamber to king John, with whom he grew into the higheſt favour. In 1427 he was obliged to retire: the courtiers exerted all their endeavours to ruin him: they complained, that a man of no military ſkill, of no virtues whatever, ſhould, by mere artifice and diſſimulation, be advanced to the higheſt authority; and they could not bear, that, by the aſſiſtance of a few upſtart men, whom he had raiſed and fixed to his intereſt, he ſhould reign as abſolutely as if he were king.

They prevailed againſt him, and Alvares was baniſhed from court a year and an half: but this was the greateſt affliction imaginable to the king; who ſhow-

ed all marks of diſtreſs the moment he was removed from his preſence, and now thought and ſpoke of nothing but Alvares. He was therefore recalled; and, being inveſted with his uſual authority, revenged himſelf ſeverely upon his enemies, by perſuading the king to baniſh them. Of the 45 years he ſpent at court, he enjoyed for 30 of them ſo entire an aſcendency over the king, that nothing could be done without his expreſs orders: nay, it is related by Mariana, that the king could not change an officer or ſervant, or even his clothes or diet, without the approbation of Alvares. In ſhort he wanted nothing to complete his grandeur but the name of king: he had all the places in the kingdom at his diſpoſal; he was maſter of the treaſury, and by bounties had ſo gained the hearts of the ſubjects, that the king, tho' his eyes now were opened, and his affections ſufficiently turned againſt him, durſt not complain.

But the day of reckoning was approaching, and at length he was ſeized; yet not directly, openly, and violently, but with ſome of that management which upon a ſimilar occaſion was formerly employed by Tiberius againſt Sejanus. During his confinement, he made ſeveral attempts to ſpeak to the king in perſon; but not being able to effect this, he ſent the following letter, from which, as well as from the reſt of Alvares's hiſtory, all court-favourites may draw abundant matter for edification and inſtruction. "Sir, it is five "and forty years ſince I was admitted into your ſervice. I do not complain of the rewards I have received? they were greater than my merits or expectation, as I ſhall not deny. There was but one "thing wanting to complete my happineſs; and that "was, to have fixed proper limits in time to this great "fortune of mine. While, inſtead of chooſing retirement, after the example of the greateſt men, I ſtill "continued in the employment, which I thought not "only my duty, but neceſſary for your intereſt, I fell "into this miſfortune. It is very hard that I ſhould "be deprived of liberty, when I have riſked life and "fortune more than once to reſtore it to you. Grief "prevents me from ſaying more. I know that the "Deity is provoked againſt me by my ſins; but it will "be ſufficient for me, if his anger is appeaſed by the "calamities I now ſuffer. I can no longer bear that "prodigious maſs of riches, which it was wrong in "me to have heaped together. I ſhould willingly "reſign them, but that every thing I have is in your "power; and I am denied the opportunity of ſhowing "mankind, that you have raiſed a perſon to the height "of greatneſs, who can condemn wealth as well as procure it, and give it back to him from whom he received it. But I deſire you in the ſtrongeſt terms, "that, as I was obliged, by the lowneſs of the treaſury, to raiſe 10,000 or 12,000 crowns, by methods "I ought not to have taken, you will reſtore them to "the perſons from whom they were extorted. If you "will not grant this on account of the ſervices I have "done, yet I think it neceſſary to be done from the "reaſon of the thing."

This letter, however, produced no effect in his favour: Alvares was tried, and condemned to loſe his head. After condemnation, he was removed to Valladolid; and having confeſſed himſelf, and received the ſacrament, he was carried upon a mule to the market-place,

Aludels in the middle of which a large scaffold was erected. Mounting the scaffold, he paid reverence to the cross, and presently gave his hat and signet to his page, saying, "These are the last gifts you will ever receive from me." He then submitted himself to the axe with the utmost intrepidity. Dr Geddes relates, that he was executed the 4th of June, others the 5th of July, 1453.

ALUDELS, in chemistry, are earthen pots without bottoms, inserted into each other, and used in sublimations.

ALVEARIUM, in anatomy, the bottom of the *concha*, or hollow of the outer ear.

ALVEARIUM also signifies a bee-hive. The word is formed of *alveus*, a "channel or cavity;" in allusion to the *alveoli*, or cells in bee-hives.

Some of the ancients use also the word *alvearium* for a bee-house, more usually called among us *apiary*.

ALVEARIUM is sometimes also used figuratively, to denote a collection; in which sense, *alvearium* amounts to much the same with what we otherwise call *thesaurus*, *cornucopia*, or the like. Vinc. Boreus has published an *alvearium* of law.

ALVEOLUS, in natural history, the name of the waxen cells in bee-hives. Also the name of a sea-fossil of a conic figure, composed of a number of cells, like bee-hives, joined into each other, with a pipe of communication.

ALVEOLUS, in anatomy, the sockets in the jaws wherein the teeth are fixed.—Some writers speak of teeth growing without *alveoli*. Pliny mentions a person who had a tooth in his palate. Eustachius relates, that he saw a man who at 60 had a tooth growing out of the middle of his fauces. Holler gives an instance of a person whose teeth were of a piece with his jaws, without any insertion into *alveoli*.

ALUM, in chemistry, a clear and transparent saline matter, usually sold in large masses, of a very austere and astringent taste, useful in medicine and in various arts.

Most of the alum to be met with is artificially prepared by the methods related in their proper place under the article *CHEMISTRY*, or by others similar to them; tho' sometimes a small quantity is produced naturally. This native alum is mixed with heterogeneous matters, or effloresces in various forms upon the ores during calcination. It rarely occurs in a crystallized state, though thus it is said to be met with in Egypt, Sardinia, Spain, Bohemia, and other places. It is also found in the waters, impregnated with fixed air, but very seldom in fountains or hot medicated waters.

There are several kinds of alum to be met with; but these differ from one another only in being mixed with some salts which are not of the aluminous kind. That called the Roman alum has been considered as preferable to any other. This is usually met with in small crystals, and has a reddish colour, most probably owing to a small quantity of calx of iron, which, however, does not in the least impair its qualities. The other kinds of alum contain a portion either of vitriolated tartar or sal ammoniac, according to the nature of the alkali used in its preparation. Mr Bergman informs us, that the vegetable alkali, if pure, does not hurt the alum, though it be added in the preparation; but that the volatile alkali, by adulterating it with a por-

tion of vitriolic sal ammoniac, renders it unfit for some purposes. The alum, made by adding a portion of clay to the liquor at the beginning of the boiling, he considers as equal, if not superior, to Roman alum. He informs us also, that a kind of alum some time ago began to be manufactured at Brunswick, which was equal in quality to the Roman alum. On a chemical analysis of this alum he found it mixed with cobalt.

This salt is extremely useful in the art of dyeing; as by means of it a great number of colours are fixed and rendered permanent upon cloth, which otherwise would either not adhere in any degree, or only for a very short time. In what manner this is accomplished, we are very much ignorant; the conjectures and theories on this subject are related under the article *DYEING*. It constitutes the basis of crayons, which generally consist of the earth of alum finely powdered and tinged for the purpose. In the preparation of Prussian blue, it prevents the basis of martial vitriol, which is soluble in acids, from being precipitated by the superfluous alkali employed in the preparation of that pigment; that is, the alkali which is not saturated by the colouring matter. As this basis adheres more strongly than the clay to the vitriolic acid, and would form a green by the mixture of its yellowness, the white earth of alum likewise, according to its quantity, dilutes the darker colours, even black itself, and produces an infinite number of shades. It is also of use in the making of candles; for being mixed with the tallow, it gives it an hardness and consistence which it has not naturally. Wood sufficiently soaked in a solution of alum does not easily take fire; and the same is true of paper impregnated with it; which for that reason is very properly employed in preserving gun-powder, as it also excludes the moisture of the air. Paper impregnated with alum is useful in whitening silver, and silvering brass without heat. Alum is also of use in tanning, where it assists in restoring the cohesion of the skins almost entirely destroyed by the lime. Vintners fine down their wines, &c. with alum; fishers use it to dry cod-fish with; and bakers have mixed it with the flour to make their bread compact and white: to this last use of it great objections have been made; but unjustly, for it is entirely innocent, and now seldom used.

In medicine it is of considerable use as an astringent and tonic. It is reckoned particularly serviceable for restraining hemorrhagies, and immoderate secretions from the blood; but less proper in intestinal fluxes. In violent hemorrhagies, it may be given in doses of 15 or 20 grains, and repeated every hour or half hour till the bleeding abates: in other cases, smaller doses are more advisable; large ones being apt to nauseate the stomach, and occasion violent constipations of the bowels. It is used also externally, in astringent and repellent lotions and collyria. Burnt alum taken internally has been highly extolled in cases of colic. In such instances, when taken to the extent of a scruple for a dose, it has been said gently to move the belly, and give very great relief from the severe pain. Its officinal preparations are, for internal use, *pulvis stypticus*, and *aqua styptica* for external applications, the *aqua aluminis*, and *coagulum aluminis* and *alumen ustum*; which last is no other than the alum dried by fire, or freed from the watery moisture, which, like other salts, it always retains in its crystalline form. By this

Alum this loss of its water it becomes sharper, so as to act as a slight escharotic; and it is chiefly with this intention that it is employed in medicine, being very rarely taken internally. For these preparations, see PHARMACY.

ALUM mines are said to have been first found in Italy in the year 1460; and in 1506 king Henry VII. made a monopolising grant of this commodity to Augustine Chigi, a merchant of Sienna. In the year 1608, the manufacture of alum was first invented, and successively practised in England, meeting with great encouragement in Yorkshire, where it was first made, from Lord Sheffield, and other gentlemen of that county. King James I. by advice of his ministry, assumed the monopoly of it to himself, and therefore prohibited the importation of foreign alum; and in 1625 the importation of it was further prohibited by the proclamation of Charles I.

ALUM-works, places where alum is prepared, and manufactured in quantities for sale. They differ from alum-mines, as in the former an artificial alum, and in the latter natural alum, is produced.

ALUNTIUM, ALONTIUM, (anc. geog.), a town in the north of Sicily, situated on a steep eminence, at the mouth of the Chydas; said to be as old as the war of Troy. Now in ruins; from which arose the hamlet *St Philadelfo*, in the Val di Demona. The inhabitants were called *Haluntini*.

ALVUS, in anatomy, a term used for the belly in general, but more frequently applied to the bowels.

ALWADII, a sect of Mahometans who believe all great crimes to be unpardonable.—The Alwadii stand in opposition to the Morgii. They attribute less efficacy to the true belief in the salvation of men than the rest of the Mussulmans.

ALYSSUM, ALLYSON, or ALLYSOIDES, Madwort; (from *αλυσσω*, to be mad; because it was believed to have the property of curing madness): A genus of the filiculosa order, belonging to the tetradynamia class of plants; and, in the natural method, ranking under the 39th order, *Siliquosa*. The characters are: The calyx is an oblong four-leav'd perianthium: The corolla consists of four cruciform petals; with claws the length of the calyx, the petals shorter: The stamina consist of six filaments, the length of the calyx, two of them rather shorter and denticulated; the antheræ are erect and expanding: The pistillum has an ovate germen; the stylus is simple, and the length of the stamina; the stigma is obtuse: The pericarpium is a sub-globular emarginated silicle, furnished with a bilocular stylus, having an elliptic partition: The seeds are few, orbicular, and affixed to filiform receptacles.

Species. Of this genus, Linnæus enumerates 19 species; but none of them are remarkable, either for beauty, or any other property, except the halimifolium, or madwort with whole spear-shaped leaves. This spreads itself upon the ground, and never rises to any height. It produces, at the extremity of its branches, very pretty tufts of small white flowers; of which it is seldom destitute for six or seven months successively; for which reason it well deserves a place in the gardens of the curious.

Culture. Though these plants are natives of the southern parts of Europe; yet, if planted on a dry, lean, or rubbishy soil, they will endure our severest win-

ters in the open air.—The halimifolium seldom continues above two or three years, and must therefore be often sown to preserve it; or if the seeds are suffered to fall, the plants will rise without any trouble. It may also be propagated by cuttings, which ought to be planted in April or May, and are very apt to take root, if kept shaded in the heat of the day, and gently refreshed with water.

This plant, as already observed, was thought to cure some kinds of madness; but the present practice has entirely rejected it for this or any other purpose.

ALYTARCHA, a priest of Antioch in Syria, who, in the games instituted in honour of the gods, presided over the officers who carried rods to clear away the crowd and keep order.

In the Olympic games, the alytarches had the same command, and obliged every person to preserve order and decency.

ALZIRA, a town of Spain, in the kingdom of Valencia, seated on the river Xucar, E. Long. 0. 20. N. Lat. 39. 10.

AMA, in ecclesiastical writers, denotes a vessel wherein wine, water, or the like, were held, for the service of the eucharist. In this sense the word is also written amula; sometimes also hama, and hamula.

AMA is sometimes also used for a wine-measure, as a cask, pipe, or the like.

AMABYR, a barbarous custom which formerly prevailed in several parts of England and Wales, being a sum of money paid to the lord when a maid was married within his lordship. The word is old British, and signifies "the price of virginity."

AMADABAT, a corruption from AHMED ABAD, or *Ahmed's city*, (so called from a king of that name); a large and populous city of Indostan, and the capital of the province of Guzerat. It is situated in E. Long. 72. 12. N. Lat. 23. 0. Amadabat was formerly called *Guzerat*; and by Shah Jehân nicknamed *Gherd-abâd*, or "the habitation of dust," because it was much incommoded therewith. It was the seat of the Guzerat kings, as it is now of the Mogul governor. The city stands in a beautiful plain; and is watered by the little river Sabremetti, which, though not deep, in time of rains overflows the plains prodigiously. The walls are built with stone and brick, flanked at certain distances with great round towers and battlements. It has twelve gates; and including the suburbs, is about four miles and an half long. The streets are wide. The *meydan shâh*, or king's square, is 700 paces long, and 400 broad, planted round with trees. On the west side is the castle, well walled with free stone, and as spacious as a little city; but its inward appearance is not conformable to its external magnificence. The caravan-sera is on the south of the square, and its chief ornament. Near the meydan also is the king's palace, whose apartments are richly ornamented: and in the midst of the city is the English factory, where they purchase fine chintz, calicoes, and other Indian merchandise. The place is so full of gardens stored with fruit-trees, that from an eminence it looks like a wood. The Hindoos have here an hospital for sick beasts, and another for sick birds, which they take great care of. According to some late accounts, this city is little inferior to the best in Europe, and is thought to yield ten times as much revenue as Surat.

AMADAN,

Alytarcha
||
Amadabat.

Amadan
||
Amak

AMADAN, or HAMADAN, a town of Persia, between Taurus and Ispahan, E. Long. 47. 4. N. Lat. 35. 15. It is seated at the foot of a mountain, where there are a great many springs, which water the adjacent country. The extent of the city is very large; but there are a great many waste spots within it, as well as cultivated land. The houses are built of brick hardened in the sun, and have but a very indifferent aspect. There is but one tolerable street; and that is where stuffs, garments, and the like, are exposed to sale: it is straight, long, and wide; and the shops are very well furnished. The adjacent parts are fruitful in corn and rice, insomuch that the neighbouring provinces are supplied from hence. It is said to enjoy a very salubrious air; but the cold in winter is intense. The Armenians have a church in this town; but it is a very ill-contrived structure. The Jews have a synagogue near a tomb, where they pretend Esther and Mordecai lie interred. To this place they come in pilgrimage from several parts of the Levant. About a league from Amadan, there is a mountain called *Nalbana*, which abounds with all sorts of curious herbs. In the spring, people flock to this mountain from all parts to recover their health, by sucking in the salutary effluvia with their breath.

Amadan is a very ancient city. It is said to have been destroyed by Nebuchadnezzar, and rebuilt by Darius, who brought hither all his riches. The kings of Persia frequently retired to this place on account of its delightful situation; for which reason it obtained the name of the *Royal city*. It was conquered by the khalif Othman, and narrowly escaped being destroyed by Jenghiz Khan in 1220. It had then strong walls and a good castle, which are now in ruins. Its present beauty consists in its gardens and springs.

AMADANAGER, a town in the hither peninsula of India, in the province of Decan. E. Long. 74. 15. N. Lat. 18. 10.—It was taken by the Moguls in 1598, after a siege of six months; being at that time defended by a strong castle, situated on an eminence, and surrounded with deep ditches, into which several springs discharged their waters.

AMADIA, a trading town of Asia, in Curdistan, belonging to the Turks; seated on a high mountain. E. Long. 43. 1. N. Lat. 36. 25.

AMADOW, a kind of black-match, tinder, or touch-wood, which comes from Germany. It is made of a sort of large mushrooms, or spongy excrescences, which commonly grow on old trees, especially oaks, ash, and firs. This substance being boiled in common water, and afterwards dried and well beaten, is then put into a strong lye prepared with salt-petre, after which it is again put to dry in an oven. The druggists sell this match wholesale in France, and several hawkers retail it. Some give to the amadow the name of *Pyrotechnical Sponge*, because of its aptness to take fire.

AMADOWRY, a kind of cotton which comes from Alexandria, by the way of Marseilles.

AMAIN, in the sea-language, a term importing to lower something at once. Thus, to *strike amain*, is to lower, or let fall, the top-sails; to *wave amain*, is to make a signal, by waving a drawn sword, or the like, as a demand that the enemy strike their top-sails.

AMAK, a small island in the Baltic sea, near Copenhagen, from which it is separated by a canal,

N^o 13.

over which there is a draw-bridge. Amak is about four miles long and two broad; and is chiefly peopled by the descendants of a colony from East Friesland, to whom the island was consigned by Christian II. at the request of his wife Elizabeth, sister of Charles V. for the purpose of supplying her with vegetables, cheese, and butter. From the intermarriages of these colonies with the Danes, the present inhabitants are chiefly descended; but as they wear their own dress, and enjoy peculiar privileges, they appear a distinct race from the natives. The island contains about six villages, and between 3000 and 4000 souls. It has two churches, in which the ministers preach occasionally in Dutch and Danish. The inhabitants have their own inferior tribunals; but in capital offences are amenable to the king's court of justice at Copenhagen. The old national habit, brought by the original colony when they first migrated to the island, is still in use amongst them. It resembles the habit of the ancient quakers, as represented in the pictures of the Dutch and Flemish painters. The men wear broad-brimmed hats, black jackets, full glazed breeches of the same colour, loose at the knee, and tied round the waist. The women were dressed chiefly in black jackets and petticoats, with a piece of blue glazed cloth bound on their heads. The island is laid out in gardens and pastures; and still, according to the original design, supplies Copenhagen with milk, butter, and vegetables. E. Long. 12. 10. N. Lat. 55. 20.

AMAL, a town of Sweden, in the province of Daland, seated on the river Weser. It has a good harbour, and carries on a great trade, especially in timber, deals, and tar. E. Long. 12. 40. N. Lat. 58. 50.

AMALEK, the son of Eliphaz, by Timna his concubine, and the grandson of Esau, Gen. xxxvi. 12. and 1 Chr. i. 36. Amalek succeeded Gatam in the government of Edom. He was the father of the Amalekites; a powerful people who dwelt in Arabia Petraea, between the Dead Sea and the Red Sea, or between Havila and Shur, (1 Sam. xv. 7.); sometimes in one canton, and sometimes in another. It does not appear that they had cities; for there is no mention of any but one in the Scriptures, (*id. ib.* 5.); they living generally in hamlets, caves, or tents.

The Israelites had scarce passed the Red Sea on their way to the wilderness, before the Amalekites came to attack them in the deserts of Raphidim, (Ex. xvii. 8. &c.); and put those cruelly to the sword who were obliged, either through fatigue or weakness, to remain behind. Moses, by divine command, directed Joshua to fall upon this people; to record the act of inhumanity which they had committed in a book, in order to have it always before his eyes; and to revenge it in the most remarkable manner. Joshua therefore fell upon the Amalekites, and defeated them while Moses was upon the mountain, with Aaron and Hur in company. Moses, during the time of the engagement, held up his hands, to which the success of the battle was owing; for as often as he let them down, Amalek prevailed. But Moses's hands being tired, Aaron and Hur supported his arms, and held them extended, while the battle lasted, which was from morning till the approach of night, when the Amalekites were cut in pieces. This happened in the year of the world 2513, before Christ 1491.

The

Amalek.

The ground of the enmity of the Amalekites against the Israelites is generally supposed to have been an innate hatred from the remembrance of Jacob's depriving their progenitor both of his birthright and blessing. Their falling upon them, however, and that without any provocation, when they saw them reduced to so low a condition by the fatigue of their march, and the excessive drought they laboured under, was an inhuman action, and justly deserved the defeat which Joshua gave them. Under the Judges, (v. 3.), we see the Amalekites united with the Midianites and Moabites, in a design to oppress Israel; but Elrud delivered the Israelites from Eglon king of the Moabites, (Judges iii.), and Gideon (chap. viii.) delivered them from the Midianites and Amalekites. About the year of the world 2930, Saul marched against the Amalekites, advanced as far as their capital, and put all the people of the country to the sword; but spared the best of all the cattle and moveables, contrary to a divine command; which act of disobedience was the cause of Saul's future misfortunes.

After this war, the Amalekites scarce appear any more in history. However, about the year of the world 2949, a troop of Amalekites came and pillaged Ziklag, which belonged to David, (1 Sam. xxx.), where he had left his two wives Ahinoam and Abigail; but he returning from an expedition which he had made in the company of Achish into the valley of Jezreel, pursued them, overtook and dispersed them, and recovered all the booty which they had carried off from Ziklag.

The Arabians maintain Amalek to have been the son of Ham, and grandson of Noah; that he was the father of Ad, and grandfather of Schedad. Calmet thinks that this opinion is by no means to be rejected; as it is not very probable that Amalek, the son of Eliphaz, and grandson of Esau, should be the father of a people so powerful and numerous as the Amalekites were when the Israelites departed out of Egypt. Moses in the book of Genesis (xiv. 7.) relates, that in Abraham's time, long before the birth of Amalek the son of Eliphaz, the five confederate kings carried the war into Amalek's country, about Kadesh; and into that of the Amorites, about Hazezontamar. The same Moses (Numb xxiv. 20.) relates, that the diviner Balaam, observing at a distance the land of Amalek, said, in his prophetic style, "Amalek is the first, the head, the original of the nations; but his latter end shall be, that he perish for ever." Our commentator observes, that this epithet of the first of nations cannot certainly agree with the Amalekites descended from the son of Eliphaz, because the generation then living was but the third from Amalek. Besides, Moses never reproaches the Amalekites with attacking their brethren the Israelites; an aggravating circumstance, which he would not have omitted were the Amalekites descended from Esau; in which case they had been the brethren of the Israelites. Lastly, We see the Amalekites almost always joined in the Scripture with the Canaanites and Philistines, and never with the Edomites; and when Saul made war upon the Amalekites, and almost utterly destroyed them, we do not find that the Edomites made the least motion towards their assistance, nor to revenge them afterwards. Thence it is thought probable, that the Amalekites who are so often mentioned in Scrip-

Vol. I. Part II.

ture were a free people descended from Canaan, and devoted to the curse as well as the other Amorites, and very different from the descendants of Amalek, the grandson of Esau.

Amalek,
Amalfi.

The accounts which the Arabians give us of the Amalekites destroyed by Saul are as follow. Amalek was the father of an ancient tribe in Arabia, exterminated in the reign of Saul. This tribe contained only the Arabians who are called *Pure*; the remains whereof were mingled with the posterity of Joktan and Adnan, and so became Mosarabes or Mostaarabes; that is to say, Arabians blended with foreign nations. They farther believe, that Goliath, who was overcome by David, was king of the Amalekites; and that the giants who inhabited Palestine in Joshua's time were of the same race. That at last part of the Amalekites retired into Afric while Joshua was yet living, and settled upon the coasts of Barbary, along the Mediterranean sea. The son of Amalek was Ad, a celebrated prince among the Arabians. Some make him the son of Uz, and grandson of Aram the son of Shem. Let this be as it will, the Mahometans say that Ad was the father of an Arabian tribe called *Adites*; who were exterminated, as they tell us, for not hearkening to the patriarch Eber, who preached the unity of God to them. Ad had two sons, Schedad and Schedid.

AMALFI, an ancient city of Italy, situated in E. Long. 15. 20. N. Lat. 40. 35.—It is said to have derived its origin from a number of Roman families, who, about the middle of the fourth century, either from private views of emolument, or in consequence of compulsory orders from the emperor, had left Rome, and embarked for Constantinople; but meeting with storms on their passage, were cast away on the shores of Salerno, and deprived of the means of pursuing their voyage. In this state of perplexity they long remained; but at last came to the resolution of settling on the present site of Amalfi, where they expected to enjoy security, and sufficient plenty of the necessaries of life. The earliest notice of them in this settlement dates no higher than the latter end of the sixth century. Impervious mountains and inaccessible coasts preserved their infant state from the first fury of the Lombards, who seldom attempted the conquest of a maritime people.

In the year 825, when this little republic had, under the patronage of the eastern emperors, attained a degree of wealth and reputation sufficient to excite the ambition of its neighbours, Sico, prince of Salerno, marched a body of troops by night, surprised Amalfi; and, carrying off the greatest part of the inhabitants, compelled them to fix at Salerno, which had lately suffered a great loss of people by an epidemical disorder. But before the fourth year of their captivity was expired, the Amalfitans took advantage of the absence of the Salernitan chiefs, who were then carrying on a war with the Beneventans; armed themselves; and, after burning and plundering Salerno, marched in triumph back to their own country.

Here they framed a better system of government, and reformed many abuses in their former legislation; adopting various measures that were likely to promote internal concord, and defeat the evil intentions of foreign enemies. Their first plan was to vest the supreme authority in a temporary prefect; but the experience

Amalfi
||
Amalgama-
tion.

of a few years caused them to prefer lodging that power in the hands of a duke elected for the term of his natural life. Under these governors Amalfi attained the summit of her military and commercial glory. It extended its territory, which reached eastward from Vico Vecchio, and westward to the promontory of Minerva, including likewise the island of Caprea, and the two islands of the Galli. Towards the north, it comprehended the cities of Lettere, Gragnans, Pimontio, and Capule di Franchi; towards the south, those of Scala, Ravelli, Minori, Majuri, Atrani, Tramonti, Agerula, Citara, Prajano, and Rosilano.

Leo IV. found the Amalfitans an useful ally in his wars with the infidels, and honoured the commonwealth with the title of *Defender of the Faith*. The Neapolitans, with whom, as Greek vassals, they were united in strict bonds of friendship, experienced many signal favours at their hands; and the Mussulmen themselves found it expedient to court their alliance, and to enter into treaty with them. Their situation had from the beginning given them a turn to commerce, and their attention to naval affairs so much consequence in the eyes of their protector, the emperor of Constantinople, that by his orders a court was established at Amalfi, for the decision of all controversies arising in maritime transactions. Its code and reports became the general rule in those cases throughout this part of Europe; its precedents and decrees were allowed to be good authority to found judgement upon even in foreign tribunals.—To crown the mercantile and naval glory of the republic, it was reserved to the lot of an Amalfitan to make, or at least to perfect, the most important discovery ever made for the improvement of navigation. Pasitano, a village which stands on the shore a few miles west of Amalfi, boasts of having given birth to Flavius Gioia, the inventor of the mariner's compass.

The merchants of this town engrossed the trade of the Levant, and transacted the commercial business of the world in a lucrative and exclusive manner. The Pisans, Venetians, and Genoese, rose upon their ruin; and, after monopolizing the emoluments of trade for some ages, made way for the more comprehensive and daring spirit of the present maritime powers.

At present Amalfi is subject to Naples, and is the see of an archbishop. It is but a shadow of what it was in its flourishing state, when it extended over the stupendous rocks that hang on each side, still crowned with battlemented walls and ruined towers. Its buildings, Mr Swinburne says, are not remarkable for elegance or size; and contain at most 4000 inhabitants, who seem to be in a poor line of life. The cathedral is an uncouth building. Under the choir is the chapel and tomb of the apostle St Andrew; in whose honour the edifice was dedicated, when Cardinal Capuano, in 1208, brought his body from Constantinople.

AMALGAM, mercury united with some metal.

AMALGAMATION, the operation of making an amalgam, or mixing mercury with any metal.

For the combination of one metal with another, it is generally sufficient that one of them be in a state of fluidity. Mercury being always fluid, is therefore capable of amalgamation with other metals without

heat; nevertheless, heat considerably facilitates the operation.

To amalgamate without heat requires nothing more than rubbing the two metals together in a mortar; but the metal to be united with the mercury should be previously divided into very thin plates or grains. When heat is used, (which is always most effectual, and with some metals indispensably necessary), the mercury should be heated till it begins to smoke, and the grains of metal made red-hot before they are thrown into it. If it be gold or silver, it is sufficient to stir the fluid with an iron rod for a little while, and then throw it into a vessel filled with water. This amalgam is used for gilding or silvering on copper, which is afterwards exposed to a degree of heat sufficient to evaporate the mercury.

Amalgamation with lead or tin is effected by pouring an equal weight of mercury into either of these metals in a state of fusion, and stirring with an iron rod. Copper amalgamates with great difficulty, and iron not at all.

AMALTHÆA, the name of the Cumæan Sibyl, who offered to Tarquinius Superbus nine books, containing the Roman destinies, and demanded 300 pieces of gold for them. He derided her; whereupon she threw three of them into the fire; and returning, asked the same price for the other six; which being denied, she burnt three more; and returned, still demanding the same price. Upon which Tarquin consulting the pontiffs, was advised to buy them. These books were in such esteem, that two magistrates were created to consult them upon extraordinary occasions.

AMALTHEA, in pagan mythology, the daughter of Melissus, king of Crete, and the nurse of Jupiter, whom she fed with goat's milk and honey. According to others, Amalthea was a goat, which Jupiter translated into the sky, with her two kids, and gave one of her horns to the daughters of Melissus, as a reward for the pains they had taken in attending him. This horn had the peculiar property of furnishing them with whatever they wished for; and was thence called the *cornucopia*, or horn of plenty.

AMALTHÆUS (Jerome, John Baptista, and Cornielle), three celebrated Latin poets of Italy, who flourished in the 16th century. Their compositions were printed at Amsterdam in 1685. One of the prettiest pieces in that collection is an epigram on two children, whose beauty was very extraordinary, though each of them was deprived of an eye:

- ' Lumine Acon dextro, capta est Leonilla sinistro;
- ' Et poterat forma vincere uterque Deos.
- ' Parve puer, lumen quod habes concede sorori;
- ' Sic tu cæcus Amor, sic erit illa Venus.'

AMAMA, (Sixtinus), professor of the Hebrew tongue in the university of Franeker, a man of great learning, was born in Friesland, and had studied under Drusius. He published a criticism upon the translation of the Pentateuch; collated the Dutch translation of the Bible with the original and the most accurate translations; and wrote a censure of the Vulgate translation of the historical books of the Old Testament, Job, the Psalms, and Canticles. It is impossible to answer the reasons whereby he shows the necessity of consulting the originals.

Amalthæa
||
Amama.

Amance nals. This he recommended so earnestly, that some
 || fynods, being influenced by his reasons, decreed, that
Amanica. none should be admitted into the ministry but such as
 had a competent knowledge of the Hebrew and Greek
 text of the Scripture. He died in 1629.

AMANCE, a town in the duchy of Lorrain, upon
 a rivulet of the same name. E. Long. 6. 10. N. Lat.
 48. 45.

AMAND, (Mark Anthony Gerard, fleur de St.), a
 French poet, was born at Roan in Normandy in 1594.
 In the epistle-dedictory to the third part of his works,
 he tells us, that his father commanded a squadron of
 ships in the service of Elizabeth queen of England for
 22 years, and that he was for three years prisoner in
 the Black Tower at Constantinople. He mentions al-
 so, that two brothers of his had been killed in an en-
 gagement against the Turks. His own life was spent
 in a continual succession of travels, which was of no ad-
 vantage to his fortune. There are miscellaneous poems
 of this author, the greatest part of which are of the
 comic or burlesque, and the amorous kind. Though
 there are many blemishes in his poems, yet he had the
 talent of reading them in so agreeable a manner, that
 every one was charmed with them. In 1650, he pu-
 blished "*Stances sur la grosseffe de la reine de Pologne
 et de Suede*" There are six stanzas of nine verses
 each. In 1653, he printed his "*Moïse fauve, idyle
 heroique*." This poem had at first many admirers :
 Mons. Chapelain called it a *speaking picture* ; but it has
 since fallen into contempt. Amand wrote also a very
 devout piece, intitled "*Stances a M. Corneille, sur son
 imitation de Jesus Christ*," which was printed at Paris
 in 1656. Mr Brossette says, that he wrote also a poem
 upon the noon, wherein he paid a compliment to
 Lewis XIV. upon his skill in swimming, in which he
 used often to exercise himself when he was young, in
 the river Siene ; but the king could not bear this poem
 to be read to him, which is said to have affected the
 author to such a degree, that he did not survive it long.
 He died in 1661, being 67 years of age. He was ad-
 mitted a member of the French academy, when it was
 first founded by cardinal Richlieu, in the year 1633 ;
 and Mr Pellisson informs us, that in 1637, at his own
 desire, he was excused from the obligation of making a
 speech in his turn, on condition that he would compile
 the comic part of the dictionary which the academy
 had undertaken, and collect the burlesque terms. This
 was a task well suited to him ; for it appears by his
 writings, that he was extremely conversant in these
 terms, of which he seems to have made a complete col-
 lection from the markets, and other places where the
 lower people resort.

AMAND, (St.), a city of France, in Bourbonnois, on
 the confines of Berry, seated upon the river Cher. It
 was built in 1410, on the ruins of Orval. E. Long. 3.
 30. N. Lat. 46. 32.

AMAND, (St.), a city of the Low Countries, in the
 earldom of Flanders, seated upon the river Scarpe. It
 contains about 600 houses, and 3000 or 4000 inhabit-
 ants. The abbot of the place is the temporal lord,
 and disposes of the magistracy. It was given to France
 by the treaty of Utrecht. E. Long. 2. 35. N. Lat.
 50. 27.

AMANICÆ PYLÆ, (Ptolemy) ; AMANIDES PY-

LÆ, (Strabo) ; AMANI PORTÆ, (Pliny) : straits or
 defiles in mount Amanus, through which Darius en-
 tered Cilicia ; at a greater distance from the sea than
 the Pylæ Ciliciæ, or Syria, through which Alexander
 passed. *Amantea*
 ||
Amaran-
 thus.

AMANTEA, a sea-port town and bishop's see of
 the kingdom of Naples, situated near the bay of Eu-
 phemia, in the province of Calabria, in E. Long. 16.
 20. N. Lat. 39. 15.

AMANUS, a mountain of Syria, separating it from
 Cilicia ; a branch of mount Taurus, (Cicero, Strabo ;
 Pliny) ; extending chiefly eastward, from the sea of Ci-
 licia, to the Euphrates : Now called *Monte Negro*, or
 rather *Montagna Neres*, by the inhabitants ; that is,
 the watery mountain, as abounding in springs and ri-
 vulets.

AMAPALLA, a city and port-town of North A-
 merica, in the province of Guatemala, seated on the
 gulph of the same name, in the Pacific ocean. W.
 Long. 63. 20. N. Lat. 12. 30.

AMARANTE, an order of knighthood, instituted
 in Sweden by queen Christina, in 1653, at the close of
 an annual feast, celebrated in that country, called
Wirtschaft. This feast was solemnized with entertain-
 ments, balls, masquerades, and the like diversions, and
 continued from evening till the next morning.—That
 princess, thinking the name too vulgar, changed it into
 that of the *feast of the gods*, in regard each person here
 represented some deity as it fell to his lot. The queen
 assumed the name of *Amarante* ; that is, unfading, or
 immortal. The young nobility, dressed in the habit of
 nymphs and shepherds, served the gods at the table.
 At the end of the feast, the queen threw off her habit,
 which was covered with diamonds, leaving it to be
 pulled in pieces by the masques ; and, in memory of so
 gallant a feast, founded a military order, called in Swe-
 dish *Ceschsellschaft*, into which all that had been present
 at the feast were admitted, including 16 lords and as
 many ladies, besides the queen. Their device was the
 cypher of *Amarante*, composed of two A's, the one e-
 rect, the other inverted, and interwoven together ; the
 whole inclosed by a laurel crown, with this motto,
Dolce nella memoria.

Bulstrode Whitlock, the English ambassador from
 Cromwell to the court of Sweden, was made a knight
 of the order of *Amarante* : on which account it seems
 to be, that we sometimes find him styled *Sir Bulstrode
 Whitlock*.

AMARANTHOIDES, in botany, the trivial name
 of a species of illecebrum. See ILLECEBRUM.

AMARANTHUS, (of α privative, and $\muαραινω$, to
 wither, because the flower of this plant, when cropped,
 does not soon wither), AMARANTH, or FLOWER-GEN-
 TLE : A genus of the pentandria order, belonging to
 the monœcia class of plants ; and, in the natural me-
 thod, ranking under the 54th order, *Miscellanea*. The
 characters are : The *male calyx* is a five or three leaved
 perianthium, erect, coloured, and persistent : There is
 no *corolla* : The *stamina* consist of five or three erect
 capillary filaments, the length of the calyx ; the an-
 theræ are oblong and versatile : The *female calyx* the
 same as the male, and no *corolla* : The *pistillum* has an
 ovate germen ; the styli are three, short, and subulated ;
 the stigmata simple and persistent : The *pericarpium* is

Amaran- an ovate capsule, three-beaked, unilocular, and cut
thus, round: The seed is one, globular, compressed, and
Amaryllis. large.

Species. Of this genus Linnæus enumerates 19 species; the most remarkable of which are the following.
 1. The tricolor, or three-coloured amaranthus. This has been long cultivated in gardens, on account of the beauty of its variegated leaves, which are of three colours, green, yellow, and red; and very elegantly mixed. When the plants are in full vigour, the leaves are large, and closely set from the bottom to the top of the stalks, and the branches form a sort of pyramid; so that there is not a more beautiful plant than this when it is in full lustre.
 2. The melancholicus bicolor, or two-coloured amaranthus. This greatly resembles the former in its manner of growth; but the leaves have only two colours, which are an obscure purple, and a bright crimson. These are so blended as to set off each other, and, when the plants are vigorous, make a fine appearance.
 3. The caudata, with very long hanging cylindrical spikes. This species is a native of America. It hath an upright stem three feet high; the leaves and stalks are of a pale green colour. The spikes of flowers are produced from the wings of the stalks, and also at the extremities of the branches. They are of a bright purple colour, and hang downward, sometimes to the length of two feet and an half; so that many of them touch the ground.
 4. The maximus, or tree-like amaranthus, grows with a strong stem, to the height of seven or eight feet. Towards the top it sends forth many horizontal branches, garnished with oblong rough green leaves. At the extremity of every shoot, the cylindrical spikes of flowers are produced. They are of a purple colour, and hang downward like the last; but are seldom half the length, though much thicker than the former.
 5. The sanguineus, with compound spikes, and oblong oval leaves. This is a native of the Bahama islands. It is an esculent plant, and bears fine flowers. It grows to the height of three feet, with purple stalks and leaves. The spikes are short and cylindrical, of a bright purple at first, but afterwards fade to a darker colour. They are frequently produced from the wings of the stalks; but at the extremity of the stalk arises a large cluster of spikes, which are placed cross-wise, with one upright stalk in the middle.
 6. The oleraceus, with obtuse indented leaves. This has no beauty; but it is used by the Indians as a substitute to cabbage.

Culture. The two first of these species being tender, require some art and care to bring them to perfection in Britain, by a succession of hot-bed, with proper waterings, airings, and shadings.

Where people are curious in having these annual plants in great perfection, there should be a glass-case erected, with upright and sloping glasses on every side, with a pit in the bottom for tan, in which the pots should be plunged. If this is raised eight or nine feet to the ridge, and the upright glasses are five feet, there will be room enough to raise these and other annual plants to great perfection; and in such a building, many tender vegetables, which rarely perfect their seeds in this climate, may be every year brought forward so as to ripen their seeds.

AMARYLLIS, LILY-ASPHODEL: A genus of the

monogynia order, belonging to the hexandria class of *Amaryllis*. plants; and, in the natural method, ranking under the 9th order, *Spathaceæ*. The characters are: The calyx is an oblong obtuse spatha, emarginated, and withering: The corolla consists of six petals, lanced: The stamina consist of six subulated filaments; the antheræ oblong, incumbent, and ascending: The pistillum has a roundish sulcated germen beneath; a filiform stylus, nearly the length of the stamina; the stigma trifid and slender: The pericarpium is an ovate trilocular capsule, with three valves: The seeds are many.

Principal Species. 1. The lutea, or autumnal narcissus. This is usually sold by gardeners, along with colchicums, for autumnal ornaments to gardens. For this purpose it is very proper, as it will keep flowering from the beginning of September to the middle of November, provided the frost is not so severe as to destroy the flowers. Although there is but one flower in each cover, yet there is a succession of flowers from the same root, especially when they are suffered to remain three or four years unremoved. The flowers seldom rise above three or four inches high. They are shaped somewhat like the flowers of the yellow crocus; the green leaves come up at the same time, like the saffron; and, after the flowers are past, the leaves increase all the winter. The roots are bulbous, and shaped like those of the narcissus; so are proper ornaments for such borders as are planted with cyclamens, saffron, autumnal crocus, colchicums, and such low autumnal flowers.
 2. The formosissima, or jacobæa lily, produces its flowers two or three times in a year, without being regular to any season. The flowers are of a deep red, the under petals very large, and the whole flower stands nodding on one side of the stalk, making a beautiful appearance. The stems of these flowers are produced from the sides of the bulbs; so that when the flowers produced on one side are decayed, another stalk arises from the other side of the bulb; but there is no more than one flower produced on the same stalk. When the roots are in vigour, flowers will be produced from March to the beginning of September.
 3. The far-nienfis, or Guernsey lily, is supposed to have come originally from Japan, but has been many years cultivated in the gardens of Guernsey and Jersey; in both which places they seem to thrive as well as if it was their native country; and from these islands their roots are sent annually to the curious in most parts of Europe. The flowers of this species are admired for the richness of their colour, which is commonly red, though they have no scent. They appear towards the end of September; and, if properly managed, will continue a month in beauty. The roots of these plants do not flower again the succeeding year, as is the case with many other bulbs: but if their bulbs contain two buds in their centre, which is often the case, they frequently flower twice in three years; after which the same individual root does not flower again in several years, but only the offsets from it.
 4. The regina, or belladonna lily, is a native of Portugal, where it was formerly cultivated in great plenty; but of late it has been supplanted by the jacobæa lily; so that the roots which have been brought from that country for some time past for the belladonna, have generally proved the jacobæa lily. This kind, if properly managed, will sometimes put out two or three stems, growing near three

Amaryllis, three feet high, and produce many flowers in each umbel, which make a fine appearance during the month of October. 5. The *zeylanica*, or Ceylon lily, is a native of the West Indies, and usually flowers in June. Sometimes the same root will flower again in autumn, but the flowers are of no long duration. 6. The *orientalis*, or lily daffodil, with leaves shaped like a tongue. This is a native of the Cape of Good Hope. The bulbs of the root are large and almost round; the leaves long, broad, and rounded at their extremities; these spread two ways on the surface of the ground, and do not come up till after the flower stem appears, which is generally in November. After the flowers are past, the leaves increase till spring, and in May they begin to decay; so that from the middle of June to October the roots are entirely destitute of leaves.

Culture. The first sort is very hardy, and will thrive in almost any soil or situation; but will succeed best in a fresh light dry soil, and not too near the dripping of trees, or too near walls. It increases very fast by offsets, by which all the other species are also to be propagated. These roots may be transplanted any time from May to the end of July; after which it will be too late to remove them.—The *jacobæa* ought to be kept in a moderate stove all winter; in which case it will send forth plenty of offsets, that will produce vigorous plants.—The roots of the Guernsey lily are generally brought over in June and July; but the sooner they are taken out of the ground after the leaves decay, the better: for altho' the roots which are taken up when their flower-stems begin to appear, will flower; yet their flowers will not be so large, nor will their roots be near so good after, as those which were removed before they sent forth fresh fibres. When these roots come over, they should be planted in pots filled with fresh, light, sandy earth, mixed with a little very rotten dung, and placed in a warm situation, observing now and then to refresh the earth with water: but by no means let them have too much wet, which would rot their roots, especially before they come up. About the middle of September, such of the roots as are strong enough to flower will begin to show the bud of their flower stem: therefore these pots ought to be removed into a situation where they may have the benefit of the sun, and be sheltered from strong winds. When the flowers begin to open, the pots should be removed under shelter, to prevent injury from too much wet.—After the flowers are decayed, the green leaves will begin to shoot forth in length; and, if sheltered from severe cold, will continue growing all winter: but they must have as much free air as possible in mild weather, and are to be covered only in great rains or frosts. For this purpose, a common hot-bed frame is the most proper shelter for them; the glasses of which may be taken off every day in dry open weather, which will encourage the leaves to grow strong and broad. The roots should be transplanted every fourth or fifth year, toward the end of June or beginning of July; the offsets also should be taken off and planted in pots, where in three years time they will produce flowers. The other species of the *amaryllis* may easily be raised by taking care to shelter them in a stove from the winter's cold.

AMARYNTHUS (anc. geog.), a hamlet of Eubœa, in the island of Eubœa, about seven stadia distant from its walls. Here Diana was worshipped by an

annual solemnity, at which those of Carystus assisted; hence the title of the goddess was *Amarynthis*, and *Amarysia*.

AMASIA (anc. geog.), now *Marpurg*, a city in the landgraviate of Hesse, on the Lahn. According to others, it is Embden in Westphalia.

AMASIA, an ancient town of Turkey, in Natolia, remarkable for the birth of Strabo the geographer. It is the residence of a bashaw, and gives its name to the province it stands in, where there are the best wines and the best fruits in Natolia. It is seated near the river Iris or Cafalmack; and was anciently the residence of the kings of Cappadocia. E. Long. 36. 10. N. Lat. 39. 33.

AMASIA, the name of the northern division of Lesser Asia, lying on the south shore of the Euxine sea in Natolia. It takes its name from Amasia the capital, mentioned in the preceding article.

AMASONIA, in botany: A genus of the angiospermia order, belonging to the didynamia class of plants; the characters of which are: The *calyx* is a tripartite monophyllous perianthium, bell-shaped and persistent: The *corolla* is monopetalous and tubular; the border quinquefid, expanding, and small: The *stamina* consist of four filaments longer than the corolla; the antheræ oval and incumbent: The *pisillum* has an ovate germen; the stylus the length of the stamina; the stigmata two, acute: There is no *pericarpium*: The *seed* is an ovate unilocular nut, the length of the calyx.

AMATHUS, a very ancient town in the south of Cyprus (Strabo, Ptolemy): so called from Amathus the founder; or, according to others, from Amath, a Phœnician town sacred to Venus, with a very ancient temple of Adonis and Venus: and hence Venus is denominated *Amathusia* (Tacitus). According to Ovid, it was a place rich in copper-ore, and where the inhabitants became *Cerastra*, or horned. Now called *Limisso*.

AMATHUS, (anc. geog.), a town of the tribe of Gad, beyond Jordan; but whether at a greater or less distance from it, is not so easy to determine. Eusebius places it in the Lower Peræa; Reland, in Ramoth-Gilead. Gabinius, proconsul of Syria, established five juridical conventions in Judea; two of which were on the other side Jordan; one at Gadara, the other at Amathus (Josephus).

AMATORII MUSCULI, in anatomy, a term sometimes used for the obliquus superior and obliquus inferior muscles of the eye, as these muscles assist in ogling or drawing the eye sideways.

AMATRICE, a city of the kingdom of Naples, in the farther Abruzzo, upon the confines of the Pope's territories, and the marquisate of Ancona.

AMAUROSIS, in medicine, a deprivation of sight, the eye remaining fair and seemingly unaffected. A perfect amaurosis is when the blindness is total; when there is still a power of distinguishing light from darkness, the disease is called by M. de St Ives an *imperfect amaurosis*. There is a periodical sort which comes on instantaneously, continues for hours, or days, and then disappears. Mr Hey, surgeon at Leeds, mentions several cases of patients afflicted with the amaurosis who were relieved by being electrified.

AMAZONIA, or the country of the American A-

Amasia
||
Amazonia.

Amazonia. AMAZONS, is situate between 50 and 70 degrees of west longitude; and between the equator and 15 degrees of south latitude; being bounded on the south by La Plata, on the west by Peru, on the north by the province of Terra Firma, and on the east by Brazil.

With respect to the Amazons said to have given name to this territory, they have been represented as governed and led to war only by their queen. No men were suffered to live among them; though those of some neighbouring nations were suffered to visit them, at a certain season, for the sake of procreation. The females issuing from this commerce were bred up with care, and instructed in what relates to war and government; as to the males, they were sent away into the country of their fathers. But no such nation is at present to be found, any more than the giants and cannibals mentioned by the first adventurers thither.

Amazonia is generally a flat region, abounding in woods, lakes, rivers, bogs, and morasses. The chief river, and one of the largest in the world, is that called the river of Amazons, or the Orellana, which is formed by two large rivers, the one rising in the province of Quito, a little south of the equator, in 73 degrees of west longitude, and the other, named Xauxa, rising in the lake of Bourbon, near the Andes, in ten degrees of south latitude. Those two rivers uniting on the confines of Peru and Amazonia, in three degrees odd minutes of south latitude, assume the name of Amazon; whence running eastward upwards of 200 miles, and afterwards inclining to the north, they fall into the Atlantic ocean by 84 channels, which in the rainy season overflow the adjacent country. Besides the two streams mentioned, a multitude of others, both on the north and south side, contribute to the formation of this extraordinary river. As it runs almost across the broadest part of South America, it is computed to be between four and five thousand miles in length, including all its windings. Its channel from Junta de los Reyes, about 60 degrees from its head, to the river Maranhon, is from one to two leagues broad; it then widens from three to four, and becomes gradually broader as it approaches the ocean. Between the places last mentioned, its depth is from five to ten fathom; but from Maranhon to Rio Negro it increases to 20 fathom; after which it is sometimes 30, and sometimes 50 fathoms, or more, till it comes near the end of its course. It has no sand-banks, nor does the shore shelve so as to render it dangerous for vessels. The manetia and tortois abound both upon the banks of this and the other rivers; and the fishermen must be upon their guard against the crocodiles, alligators, and water-serpents, which also swarm here.

The air, as in the countries under the same parallel, is observed to be nearly as cool under the equator as about the tropics, on account of the rains continuing longer, and the sky in that season being clouded. Besides, an easterly wind sets from the Atlantic up the river so strong, that vessels are carried by it against the stream.

The produce of the country is Indian corn and the cassavi root, of which they make flour and bread; tobacco, cotton, sugar, sarsaparilla, yams, potatoes, and other roots. They have also plenty of venison, fish, and fowl. Among the latter are vast flocks of parrots

of all colours, the flesh of which serves for food and the feathers for ornament. All the trees here are ever-greens; and fruits, flowers, and herbage, are in perfection all the year round. The principal fruits are cocoa-nuts, ananas or pine-apples, guavas, bananas, and such others as are usually found between the tropics. The forest and timber trees are cedar, Brazil wood, oak, ebony, logwood, iron-wood, so called from its weight and hardness, and several sorts of dyeing-wood.

The natives are of the common stature, with good features, a copper complexion, black eyes and hair. It is computed that there are of them about 150 different tribes or nations, and the villages are so numerous as to be within call of one another. Among those the Homagues, a people near the head of the river, are famous for their cotton manufactures; the Jurines, who live between five and ten degrees of latitude, for their joiners work; and the Wroffiares for their earthen ware. The Topinambes, who inhabit a large island in the river, are remarkable for their strength. Some of those nations frequently make war upon each other. Their armour consists of darts, javelins, bows and arrows, and they wear targets of cane, or fish skin. They make slaves of their prisoners, whom they otherwise use very well. Every tribe is governed by its respective chief or king, the marks of whose dignity are a crown of parrots feathers, a chain of lions teeth or claws hung round his neck, or girt about his waist, and a wooden sword, which he carries in his hand.

Most of those nations, except the Homagues, go naked. The men thrust pieces of cane through their ears and under-lips, as well as through the skin of the pudenda. At the gristle of their noses they also hang glass beads, which wag to and fro when they speak. They are such skilful marksmen, that they will shoot fish as they swim; and what they catch they eat without either bread or salt. They worship images, which they always carry with them on their expeditions; but they neither have temples nor any order of priests; and permit both polygamy and concubinage.

The country affords neither gold nor silver mines; only a small quantity of the former is found in the rivulets which fall into the Amazon near its sources in Peru. While the Spaniards imagined that it contained those metals, they made great efforts from Peru to reduce this territory to subjection; till being at length undeceived, they abandoned the design.

AMAZONS, in antiquity, a nation of female warriors, who founded an empire in Asia Minor, upon the river Thermoodon, along the coasts of the Black Sea. They are said to have formed a state out of which men were excluded. What commerce they had with that sex, was only with strangers; they killed all their male children; and they cut off the right breasts of their females, to make them more fit for the combat. From which last circumstance it is, that they are supposed to take their name, viz. from the privative *a*, and *μασος*, *mamma*, "breast." But Dr Bryant, in his analysis of Ancient Mythology, explodes this account as fabulous; and observes, that they were in general Cuthite colonies from Egypt and Syria, who formed settlements in different countries, and that they derived their name from *zon*, the "sun," which was the national object of worship. Vol. iii. p. 463.—It has indeed

Amazons. deed been controverted even among ancient writers, whether ever there really were such a nation as that of the Amazons. Strabo, Palephatus, and others, deny it. On the contrary, Herodotus, Pausanias, Diodorus Siculus, Trogius Pompeius, Justin, Pliny, Mela, Plutarch, &c. expressly assert it.

M. Petit, a French physician, published a Latin dissertation in 1685, to prove that there was really a nation of Amazons; it contains abundance of curious inquiries, relating to their habit, their arms, the cities built by them, &c. Others of the moderns also maintain, that their existence is sufficiently proved by the testimony of such of the historians of antiquity as are most worthy of credit; by the monuments which many of them have mentioned; and by medals, some of which are still remaining; and that there is not the least room to believe that what is said of them is fabulous.

The Amazons are mentioned by the most ancient of the Greek writers. In the third book of the *Iliad*, Homer represents Priam speaking of himself as having been present, in the earlier part of his life, in a battle with the Amazons: and some of them afterwards came to the assistance of that prince during the siege of Troy.

The Amazons are particularly mentioned by Herodotus. That historian informs us, that the Grecians fought a battle with the Amazons on the river Thermodoon, and defeated them. After their victory, they carried off all the Amazons they could take alive, in three ships. But whilst they were out at sea, these Amazons conspired against the men, and killed them all. Having, however, no knowledge of navigation, nor any skill in the use of the rudder, sails, or oars, they were driven by wind and tide till they arrived at the precipices of the lake Mæotis, in the territories of the Scythians. Here the Amazons went ashore, and marching into the country, seized and mounted the first horses they met with, and began to plunder the inhabitants. The Scythians at first conceived them to be men; but after they had had skirmishes with them, and taken some prisoners, they discovered them to be women. They were then unwilling to carry on hostilities against them; and by degrees a number of the young Scythians formed connections with them, and were desirous that these gentle dames should live with them as wives, and be incorporated with the rest of the Scythians. The Amazons agreed to continue their connection with the Scythian husbands, but refused to associate with the rest of the inhabitants of the country, and especially with the women of it. They afterwards prevailed upon their husbands to retire to Sarmatia, where they settled. "Hence," says Herodotus, "the wives of the Sarmatians still continue their ancient way of living. They hunt on horseback in the company of their husbands, and sometimes alone. They march with their armies, and wear the same dress with the men. The Sarmatians use the Scythian language, but corrupted from the beginning, because the Amazons never learned to speak correctly. Their marriages are attended with this circumstance: no virgin is permitted to marry till she has killed an enemy in the field; so that some always grow old before they can qualify themselves as the law requires."

Diodorus Siculus says, "There was formerly a nation who dwelt near the river Thermodoon, which was

Amazons. subjected to the government of women, and in which the women, like men, managed all the military affairs. Among these female warriors, it is said, was one who excelled the rest in strength and valour. She assembled together an army of women, whom she trained up in military discipline, and subdued some of the neighbouring nations. Afterwards, having by her valour increased her fame, she led her army against the rest; and being successful, she was so puffed up, that she styled herself the daughter of Mars, and ordered the men to spin wool, and do the work of the women within doors. She also made laws, by which the women were enjoined to go to the wars, and the men to be kept at home in a servile state, and employed in the meanest offices. They also debilitated the arms and thighs of those male children who were born to them, that they might be thereby rendered unfit for war. They feared the right breasts of their girls, that they might be no hinderance to them in fighting: from whence they derived the name of Amazons. Their queen, having become extremely eminent for skill and knowledge in military affairs, at length built a large city at the mouth of the river Thermodoon, and adorned it with a magnificent palace. In her enterprizes she exactly adhered to military discipline and good order; and she added to her empire all the adjoining nations, even to the river Tanais. Having performed these exploits, she at last ended her days like a hero, falling in a battle, in which she had fought courageously. She was succeeded in the kingdom by her daughter, who imitated the valour of her mother, and in some exploits excelled her. She caused the girls from their very infancy to be exercised in hunting, and to be daily trained up in military exercises. She instituted solemn festivals and sacrifices to Mars and Diana, which were named Tauropoli. She afterwards carried her arms beyond the river Tanais, and subdued all the people of those regions, even unto Thrace. Returning then with a great quantity of spoils into her own kingdom, she caused magnificent temples to be erected to the deities before mentioned; and she gained the love of her subjects by her mild and gentle government. She afterwards undertook an expedition against those who were on the other side of the river, and subjected to her dominion a great part of Asia, extending her arms as far as Syria.

Diodorus also mentions another race of Amazons who dwelt in Africa; and whom he speaks of as being of greater antiquity than those who lived near the river Thermodoon. "In the western parts of Lybia," says he, "upon the borders of those tracts that are habitable, there was anciently a nation under the government of women, and whose manners and mode of living were altogether different from ours. It was the custom for these women to manage all military affairs; and for a certain time, during which they preserved their virginity, they went out as soldiers into the field. After some years employed in this manner, when the time appointed for this purpose was expired, they associated themselves with men, in order to obtain children. But the magistracy, and all public offices, they kept entirely in their own hands. The men, as the women are with us, were employed in household affairs, submitting themselves wholly to the authority of their wives. They were not permitted to take any part in military

Amazons. military affairs, or to have any command, or any public authority, which might have any tendency to encourage them to cast off the yoke of their wives. As soon as any child was born, it was delivered to the father, to be fed with milk or such other food as was suitable to its age. If females were born, they seared their breasts, that they might not be burdensome to them when they grew up; for they considered them as great hindrances in fighting."

Justinian represents the Amazonian republic to have taken its rise in Scythia. The Scythians had a great part of Asia under their dominion upwards of 400 years, till they were conquered by Ninus, the founder of the Assyrian empire. After his death, which happened about 1150 years before the Christian æra, and that of Semiramis and their son Ninias, Ilinus and Scopolites, princes of the royal blood of Scythia, were driven from their country by other princes, who like them aspired to the crown. They departed with their wives, children, and friends; and being followed by a great number of young people of both sexes, they passed into Asiatic Sarmatia, beyond mount Camassus, where they formed an establishment, supplying themselves with the riches they wanted, by making excursions into the countries bordering on the Euxine Sea. The people of those countries, exasperated by the incursions of their new neighbours, united, surprised, and massacred the men.

The women then resolving to revenge their death, and at the same time to provide for their own security, resolved to form a new kind of government, to choose a queen, enact laws, and maintain themselves, without men, even against the men themselves. This design was not so very surprising as at first sight appears: for the greatest number of the girls among the Scythians had been inured to the same exercises as the boys; to draw the bow, to throw the javelin, to manage other arms; to riding, hunting, and even the painful labours that seem reserved for men; and many of them, as among the Sarmatians, accompanied the men in war. Hence they had no sooner formed their resolution, than they prepared to execute it, and exercised themselves in all military operations. They soon secured the peaceable possession of the country; and not content with showing their neighbours that all their efforts to drive them thence or subdue them were ineffectual, they made war upon them, and extended their own frontiers. They had hitherto made use of the instructions and assistance of a few men that remained in the country; but finding at length that they could stand their ground, and aggrandize themselves, without them, they killed all those whom flight or chance had saved from the fury of the Sarmatians, and for ever renounced marriage, which they now considered as an unsupportable slavery. But as they could only secure the duration of their new kingdom by propagation, they made a law to go every year to the frontiers, to invite the men to come to them; to deliver themselves up to their embraces, without choice on their part, or the least attachment; and to leave them as soon as they were pregnant. All those whom age rendered fit for propagation, and were willing to serve the state by breeding girls, did not go at the same time in search of men: for in order to obtain a right to promote the multiplication of the species, they must first have contributed to its destruction;

Nº 13.

Amazons. nor was any thought worthy of giving birth to children till she had killed three men.

If from this commerce they brought forth girls, they educated them; but with respect to the boys, if we may believe Justin, they strangled them at the moment of their birth: according to Diodorus Siculus, they twisted their legs and arms, so as to render them unfit for military exercises; but Quintus Curtius, Philostratus, and Jordanus, say, that the less savage sent them to their fathers. It is probable, that at first, when their fury against the men was carried to the greatest height, they killed the boys: that when this fury abated, and most of the mothers were filled with horror at depriving the little creatures of the lives they had just received from them, they fulfilled the first duties of a mother; but, to prevent their causing a revolution in the state, maimed them in such a manner as to render them incapable of war, and employed them in the mean offices which these warlike women thought beneath them: in short, that, when their conquests had confirmed their power, their ferocity subsiding, they entered into political engagements with their neighbours; and the number of the males they had preserved becoming burthensome, they, at the desire of those who rendered them pregnant, sent them the boys, and continued still to keep the girls.

As soon as the age of the girls permitted, they took away the right breast, that they might draw the bow with the greater force. The common opinion is, that they burnt that breast, by applying to it, at eight years of age, a hot brazen instrument, which insensibly dried up the fibres and glands: some think that they did not make use of so much ceremony, but that when the part was formed they got rid of it by amputation: some, again, with much greater probability, assert, that they employed no violent measures; but, by a continual compression of that part from infancy, prevented its growth, at least so far as to hinder its ever being incommodious in war.

Plutarch, treating of the Amazons in his life of Theseus, considers the accounts which had been preserved concerning them as partly fabulous and partly true. He gives some account of a battle which had been fought between the Athenians and the Amazons at Athens; and he relates some particulars of this battle which had been recorded by an ancient writer named Clidemus. He says, "That the left wing of the Amazons moved towards the place which is yet called Amazonium, and the right to a place called Pryx, near Chrysa; upon which the Athenians, issuing from behind the temple of the muses, fell upon them; and that this is true, the graves of those that were slain, to be seen in the streets that lead to the gate Piraica, by the temple of the hero Chalcoedus, are a sufficient proof. And here it was that the Athenians were routed, and shamefully turned their backs to women, as far as to the temple of the Furies. But fresh supplies coming in from Palladium, Ardetus, and Lyceum, charged their right wing, and beat them back into their very tents; in which action a great number of the Amazons were slain." In another place he says, "It appears that the passage of the Amazons through Thesaly was not without opposition; for there are yet to be seen many of their sepulchres near Scotusæa and Cy-nocephalæ." And in his life of Pompey, speaking of the

Amazons. the Amazons, Plutarch says, "They inhabit those parts of mount Caucasus that look towards the Hyrcanian sea, (not bordering upon the Albanians, for the territories of the Getæ and the Leges lie betwixt) : and with these people do they yearly, for two months only, accompany and cohabit, bed and board, near the river Thermoodon. After that they retire to their own habitations, and live alone all the rest of the year."

Quintus Curtius says, "The nation of the Amazons is situated upon the borders of Hyrcania, inhabiting the plains of Thermiscyra, near the river Thermoodon. Their queen was named Thalestris, and she had under her subjection all the country that lies between mount Caucasus and the river Phasis. This queen came out of her dominions, in consequence of an ardent desire she had conceived to see Alexander; and being advanced near the place where he was, she previously sent messengers to acquaint him, that the queen was come to have the satisfaction of seeing and conversing with him. Having obtained permission to visit him, she advanced with 300 of her Amazons, leaving the rest of her troops behind. As soon as she came within sight of the king, she leaped from her horse, holding two javelins in her right hand. The apparel of the Amazons does not cover all the body; for their left side is naked down to the stomach; nor do the skirts of their garments, which they tie up in a knot, reach below their knees. They preserve their left breast entire, that they may be able to suckle their female offspring; and they cut off and fear their right, that they may draw their bows, and cast their darts, with the greater ease. Thalestris looked at the king with an undaunted countenance, and narrowly examined his person; which did not, according to her ideas, come up to the fame of his great exploits: For the barbarians have a great veneration for a majestic person, esteeming those only to be capable of performing great actions, on whom nature has conferred a dignified appearance. The king having asked her whether she had any thing to desire of him, she replied, without scruple or hesitation, that she was come with a view to have children by him, she being worthy to bring him heirs to his dominions. Their offspring, if of the female sex, she would retain herself; and if of the male sex, it should be delivered to Alexander. He then asked her, whether she would accompany him in his wars? But this she declined, alledging, That she had left no body to take care of her kingdom. She continued to solicit Alexander, that he would not send her back without conforming to her wishes; but it was not till after a delay of 13 days that he complied. She then returned to her own kingdom.

Justin also repeatedly mentions this visit of Thalestris to Alexander; and in one place he says, that she made a march of 25 days, in order to obtain this meeting with him. The interview between Alexander and Thalestris is likewise mentioned by Diodorus Siculus. The learned Goropius, as he is quoted by Dr Petit, laments, in very pathetic terms, the hard fate of Thalestris, who was obliged to travel so many miles, and to encounter many hardships, in order to procure this interview with the Macedonian prince; and, from the circumstances, is led to consider the whole account as incredible. But Dr Petit, with equal erudition, with equal eloquence, and with superior force of reasoning, at length determines, that her journey was not founded

Vol. I. Part II.

upon irrational principles, and that full credit is due to those grave and venerable historians by whom this transaction has been recorded. **Amazons.**

The Amazons are represented as being armed with bows and arrows, with javelins, and also with an axe of a particular construction, which was denominated the axe of the Amazons. According to the elder Pliny, this axe was invented by Penthisilea, one of their queens. On many ancient medals are representations of the Amazons, armed with these axes. They are also said to have had bucklers in the shape of a half-moon.

The Amazons are mentioned by many other ancient authors, besides those which have been enumerated; and if any credit be due to the accounts concerning them, they subsisted through several ages. They are represented as having rendered themselves extremely formidable; as having founded cities, enlarged the boundaries of their dominions, and conquered several other nations.

That at any period there should have been women, who, without the assistance of men, built cities and governed them, raised armies and commanded them, administered public affairs, and extended their dominion by arms, is undoubtedly so contrary to all that we have seen and known of human affairs, as to appear in a very great degree incredible; but that women may have existed sufficiently robust, and sufficiently courageous, to have engaged in warlike enterprises, and even to have been successful in them, is certainly not impossible, however contrary to the usual course of things. In support of this side of the question, it may be urged, that women who have been early trained to warlike exercises, to hunting, and to an hard and laborious mode of living, may be rendered more strong, and capable of more vigorous exertions, than men who have led indolent, delicate, and luxurious lives, and who have seldom been exposed even to the inclemencies of the weather. The limbs of women, as well as of men, are strengthened and rendered more robust by frequent and laborious exercise. A nation of women, therefore, brought up and disciplined as the ancient Amazons are represented to have been, would be superior to an equal number of effeminate men; though they might be much inferior to an equal number of hardy men, trained up and disciplined in the same manner.

That much of what is said of the Amazons is fabulous, there can be no reasonable doubt; but it does not therefore follow, that the whole is without foundation. The ancient medals and monuments on which they are represented are very numerous, as are also the testimonies of ancient writers. It seems not rational to suppose that all this originated in fiction, though it may be much blended with it. The Abbé Guyon speaks of the history of the Amazons as having been regarded by many persons as fabulous, "rather from prejudice than from any real and solid examination;" and it must be acknowledged, that the arguments in favour of their existence, from ancient history, and from ancient monuments, are extremely powerful. The fact seems to be, that truth and fiction have been blended in the narrations concerning these ancient heroines.

Instances of heroism in women have occasionally occurred in modern times, somewhat resembling that of the ancient Amazons. The times and the manners of chivalry in particular, by bringing great enterprises,

3 U

bold

Amazons. bold adventures, and extravagant heroism, into fashion, inspired the women with the same taste. The women, in consequence of the prevailing passion, were now seen in the middle of camps and of armies. They quitted the soft and tender inclinations, and the delicate offices of their own sex, for the toils and the toilsome occupation of ours. During the crusades, animated by the double enthusiasm of religion and of valour, they often performed the most romantic exploits; obtained indulgences on the field of battle, and died with arms in their hands, by the side of their lovers or of their husbands.

In Europe, the women attacked and defended fortifications; princesses commanded their armies, and obtained victories. Such was the celebrated Joan de Montfort, disputing for her duchy of Bretagne, and fighting herself. Such was that still more celebrated Margaret of Anjou, active and intrepid general and soldier, whose genius supported a long time a feeble husband; which taught him to conquer; which replaced him upon the throne; which twice relieved him from prison; and, oppressed by fortune and by rebels, which did not bend till after she had decided in person twelve battles.

The warlike spirit among the women, consistent with ages of barbarism, when every thing is impetuous because nothing is fixed, and when all excess is the excess of force, continued in Europe upwards of 400 years, showing itself from time to time, and always in the middle of convulsions, or on the eve of great revolutions. But there were æras and countries in which that spirit appeared with particular lustre. Such were the displays it made in the 15th and 16th centuries in Hungary, and in the islands of the Archipelago and the Mediterranean, when they were invaded by the Turks.

Among the striking instances of Amazonian conduct in modern ladies, may be mentioned that of Jane of Belleville, widow of Monf. de Clifton, who was beheaded at Paris in the year 1343, on a suspicion of carrying on a correspondence with England and the Count de Montfort. This lady, filled with grief for the death of her late husband, and exasperated at the ill treatment which she considered him as having received, sent off "her son secretly to London; and when her apprehensions were removed with respect to him, she sold her jewels, fitted out three ships, and put to sea, to revenge the death of her husband upon all the French with whom she should meet. This new corsair made several descents upon Normandy, where she stormed castles; and the inhabitants of that province were spectators more than once, whilst their villages were all in a blaze, of one of the finest women in Europe, with a sword in one hand and a torch in the other, urging the carnage, and eying with pleasure all the horrors of war."

We read in Mezeray, under the article of the Croisade, preached by St Bernard in the year 1147, "That many women did not content themselves with taking the cross, but that they also took up arms to defend it, and composed squadrons of females, which rendered credible all that has been said of the prowess of the Amazons."

In the year 1590, the League party obtained some troops from the king of Spain. Upon the news of their being disembarked, Barri de St Aunez, Henry IV.'s governor at Leucate, set out to communicate a

scheme to the Duke de Montmorenci, commander in that province. He was taken in his way by some of the troops of the League, who were also upon their march with the Spaniards towards Leucate. They were persuaded, that by thus having the governor in their hands, the gates of that place would be immediately opened to them, or at least would not hold out long. But Constantia de Cecelli, his wife, after having assembled the garrison, put herself so resolutely at their head, pike in hand, that she inspired the weakest with courage; and the besiegers were repulsed wherever they presented themselves. Shame and their great loss having rendered them desperate, they sent a message to this courageous woman, acquainting her, that if she continued to defend herself, they would hang her husband. She replied, with tears in her eyes, "I have riches in abundance: I have offered them, and I do still offer them, for his ransom; but I would not ignominiously purchase a life which he would reproach me with, and which he would be ashamed to enjoy. I will not dishonour him by treason against my king and country." The besiegers having made a fresh attack without success, put her husband to death, and raised the siege. Henry IV. afterwards sent to this lady the brevet of governess of Leucate, with the reversion for her son.

The famous Maid of Orleans, also, is an example known to every reader.

The Abbé Arnaud, in his Memoirs, speaks of a Countess of St Balmont, who used to take the field with her husband, and fight by his side. She sent several Spanish prisoners of her taking to Marshal Feuquiers; and, what is not a little extraordinary, this Amazon at home was all affability and sweetness, and gave herself up to reading and acts of piety.

Dr Johnson seems to have given some credit to the accounts which have been transmitted down to us concerning the ancient Amazons; and he has endeavoured to show, that we ought not hastily to reject ancient historical narrations because they contain facts repugnant to modern manners, and exhibit scenes to which nothing now occurring bears a resemblance. "Of what we know not, (says he), we can only judge by what we know. Every novelty appears more wonderful, as it is more remote from any thing with which experience or testimony have hitherto acquainted us; and if it passes farther, beyond the notions that we have been accustomed to form, it becomes at last incredible. We seldom consider, that human knowledge is very narrow; that national manners are formed by chance; that uncommon conjunctures of causes produce rare effects; or that what is impossible at one time or place may yet happen in another. It is always easier to deny than to enquire. To refuse credit confers for a moment an appearance of superiority which every little mind is tempted to assume, when it may be gained so cheaply as by withdrawing attention from evidence, and declining the fatigue of comparing probabilities. Many relations of travellers have been slighted as fabulous, till more frequent voyages have confirmed their veracity; and it may reasonably be imagined, that many ancient historians are unjustly suspected of falsehood, because our own times afford nothing that resembles what they tell. Few narratives will either to men or women appear more incredible than the histories of the Amazons; of female nations, of whose constitution

Amazons
||
Amba.

stitution it was the essential and fundamental law, to exclude men from all participation, either of public affairs or domestic business; where female armies marched under female captains, female farmers gathered the harvest, female partners danced together, and female wits diverted one another. Yet several ages of antiquity have transmitted accounts of the Amazons of Caucasus; and of the Amazons of America, who have given their name to the greatest river in the world, Condamine lately found such memorials as can be expected among erratic and unlettered nations, where events are recorded only by tradition, and new swarms settling in the country from time to time confuse and efface all traces of former times."

No author has taken so much pains upon this subject as Dr Petit. But, in the course of his work, he has given it as his opinion, that there is great difficulty in governing the women even at present, though they are unarmed and unpractised in the art of war. After all his elaborate inquiries and discussions, therefore, this learned writer might probably think, that it is not an evil of the first magnitude that the race of Amazons now ceases to exist.

Rousseau says, "The empire of the woman is an empire of softness, of address, of complacency. Her commands are caresses, her menaces are tears." But the empire of the Amazons was certainly an empire of a very different kind. Upon the whole, we may conclude with Dr Johnson: "The character of the ancient Amazons was rather terrible than lovely. The hand could not be very delicate that was only employed in drawing the bow and brandishing the battle-axe. Their power was maintained by cruelty, their courage was deformed by ferocity; and their example only shows, that men and women live best together."

AMAZONS, (the river of), in America. See AMAZONIA.

AMAZONIAN Habit, in antiquity, denotes a dress formed in imitation of the Amazons. Marcia, the famous concubine of the emperor Commodus, had the appellation of *Amazonian*, because she charmed him most in a habit of this kind. Hence also that prince himself engaged in combat in the amphitheatre in an Amazonian habit; and of all titles the *Amazonius* was one of those he most delighted in. — In honour either of the gallant or his mistress, the month December was also denominated *Amazonius*:—Some also apply *Amazonian habit* to the hunting-dress worn by many ladies among us.

AMBA, an Abyssinian or Ethiopic word, signifying a rock. The Abyssinians give names to each of their rocks, as *Amba-Dorbo*, the rock of a hen, &c. Some of these rocks are said to have the name of *Aorni*; and are of such a stupendous height, that the Alps and Pyrenees are but low hills in comparison of them. Amongst the mountains, and even frequently in the plains, of this country, arise steep and craggy rocks of various forms, some resembling towers, others pyramids, &c. so perpendicular and smooth on the sides, that they seem to be works of art; insomuch, that men, cattle, &c. are craned up by the help of ladders and ropes: and yet the tops of these rocks are covered with woods, meadows, fountains, fishponds, &c. which very copiously supply the animals seated thereon with all the conveniences of life. The most remarkable of these rocks is called *Amba-Geshen*. It is prodigiously steep, in the

form of a castle built of free stone, and almost impregnable. Its summit is about half a Portuguese league in breadth, and the circumference at the bottom about half a day's journey. The ascent at first is easy; but grows afterwards so steep, that the Abyssine oxen, which will otherwise clamber like goats, must be craned up, and let down with ropes. Here the princes of the blood were formerly confined, in low cottages amongst shrubs and wild cedars, with an allowance barely sufficient to keep them alive. There is, according to Kircher, in this country, a rock so curiously hollowed by nature, that at a distance it resembles a looking-glass; and opposite to this another, on the top of which nothing can be so softly whispered but it may be heard a great way off. Between many of these rocks and mountains are vast abysses, which appear very dreadful to the eye.

AMBACHT, in topography, denotes a kind of jurisdiction or territory, the possessor whereof has the administration of justice, both in *alto* and *basso*; or of what is called in the Scots law *a power of pit and gallows*, i. e. a power of drowning and hanging. In some ancient writers, *ambacht* is particularly used for the jurisdiction, government, or chief magistracy of a city. The word is very ancient, though used originally in a sense somewhat different. Ennius calls a mercenary, or slave hired for money, *ambactus*; and Cæsar gives the same appellation to a kind of dependents among the Gauls, who, without being slaves, were attached to the service of great lords.

AMBAGES. See CIRCUMLOCUTION.

AMBARVALIA, in antiquity, a ceremony among the Romans, when, in order to procure from the gods an happy harvest, they conducted the victims thrice round the corn-fields in procession, before sacrificing them — *Ambarvalia* were either of a private or public nature: the private were performed by the master of a family, and the public by the priests who officiated at the solemnity, called *fratres oves*. The prayer preferred on this occasion, the formula of which we have in Cato *de Re Rustica*, cap. cxlii. was called *carmen ambervale*. At these feasts they sacrificed to Ceres a sow, a sheep, and a bull or heifer, whence they took the name of *suovetaurilia*. The method of celebrating them was, to lead a victim round the fields, while the peasants accompanied it, and one of their number, crowned with oak, hymned forth the praises of Ceres, in verses composed on purpose. This festival was celebrated twice a-year; at the end of January, according to some, or in April, according to others; and for the second time, in the month of July.

AMBASSADOR, or EMBASSADOR, a public minister sent from one sovereign prince, as a representative of his person, to another.

Ambassadors are either ordinary or extraordinary. Ambassador *in ordinary*, is he who constantly resides in the court of another prince, to maintain a good understanding, and look to the interest of his master. Till about two hundred years ago, ambassadors in ordinary were not heard of: all, till then, were ambassadors *extraordinary*; that is, such as are sent on some particular occasion, and who retire as soon as the affair is dispatched.

By the law of nations, none under the quality of a sovereign prince can send or receive an ambassador. At Athens, ambassadors mounted the pulpit of the public

Ambacht
||
Ambassa-
dor.

Ambe, Orators, and there opened their commission, acquaint-
Amber. ing the people with their errand. At Rome, they were
introduced to the senate, and delivered their commissions
to the fathers.

Ambassadors should never attend any public solemnities, as marriages, funerals, &c. unless their masters have some interest therein: nor must they go into mourning on any occasions of their own, because they represent the person of their prince. By the Civil law, the moveable goods of an ambassador, which are accounted an accession to his person, cannot be seized on, neither as a pledge, nor for payment of a debt, nor by order or execution of judgement, nor by the king's or state's leave where he resides, as some conceive; for all actions ought to be far from an ambassador, as well that which toucheth his necessities, as his person: if, therefore, he hath contracted any debt, he is to be called upon kindly; and if he refuses, then letters of request are to go to his master. Nor can any of the ambassador's domestic servants that are registered in the secretaries of state's office be arrested in person or goods; if they are, the process shall be void, and the parties suing out and executing it shall suffer and be liable to such penalties and corporal punishment as the lord chancellor or either of the chief justices shall think fit to inflict. Yet ambassadors cannot be defended when they commit any thing against that state, or the person of the prince, with whom they reside; and if they are guilty of treason, felony, &c. or any other crime against the law of nations, they lose the privilege of an ambassador, and may be subject to punishment as private aliens.

AMBE, in *surgery*, the name of an instrument for reducing dislocated bones. In *anatomy*, a term for the superficial jutting out of a bone.

AMBER, (*Succinum*), in natural history, a solid, hard, semipellucid, bituminous substance of a particular nature, of use in medicine and in several of the arts. It has been called *ambra* by the Arabians, and *electrum* by the Greeks.

Amber has been of great repute in the world from the earliest times. Many years before Christ it was in esteem as a medicine; and Plato, Aristotle, Herodotus, Æschylus, and others, have commended its virtues. In the times of the Romans, it became in high esteem as a gem; and in the luxurious reign of Nero, immense quantities of it were brought to Rome, and used for ornamenting works of various kinds.

The most remarkable property of this substance is, that when rubbed it draws or attracts other bodies to it: and this, it is observed, it does even to those substances which the ancients thought it had an antipathy to; as oily bodies, drops of water, human sweat, &c. Add, that by the friction it is brought to yield light pretty copiously in the dark; whence it is reckoned among the native phosphori.

The property which amber possesses, of attracting light bodies, was very anciently observed. Thales of Miletus, 600 years before Christ, concluded from hence, that it was animated. But the first person who expressly mentions this substance, is Theophrastus, about the year 300 before Christ. The attractive property of amber is likewise occasionally taken notice of by Pliny, and other later naturalists, particularly by Gassendus, Kenelm Digby, and Sir Thomas Brown; but it was generally apprehended that this quality was peculiar to

amber and jet, and perhaps agate, till Gilbert published his treatise *De Magnete*, in the year 1600. From *ηλεκτρον*, the Greek name for amber, is derived the term *Electricity*, which is now very extensively applied, not only to the power of attracting light bodies inherent in amber, but to other similar powers, and their various effects, in whatever bodies they reside, or to whatever bodies they may be communicated.

Amber assumes all figures in the ground; that of a pear, an almond, a pea, &c. In amber there have been said to be letters found very well formed; and even Hebrew and Arabic characters.—Within some pieces, leaves, insects, &c. have likewise been found included; which seems to indicate, either that the amber was originally in a fluid state, or that having been exposed to the sun, it was once softened, and rendered susceptible of the leaves, insects, &c. which came in its way. The latter of these suppositions seems the more agreeable to the phenomenon; because those insects, &c. are never found in the centre of the pieces of amber, but always near the surface. It is observed by the inhabitants of those places where amber is produced, that all animals, whether terrestrial, aerial, or aquatic, are extremely fond of it, and that pieces of it are frequently found in their excrements. The bodies of insects, found buried in amber, are viewed with admiration by all the world; but of the most remarkable of these, many are to be suspected as counterfeit, the great price at which beautiful specimens of this kind sell, having tempted ingenious cheats to introduce animal bodies in such artful manners into seemingly whole pieces of amber, that it is not easy to detect the fraud.

Of those insects which have been originally inclosed in amber, some are plainly seen to have struggled hard for their liberty, and even to have left their limbs behind them in the attempt; it being no unusual thing to see, in a mass of amber that contains a stout beetle, the animal wanting one, or perhaps two of its legs; and those legs left in different places, nearer that part of the mass from which it has travelled. This also may account for the common accident of finding legs or wings of flies, without the rest of their bodies, in pieces of amber; the insects having, when entangled in the yet soft and viscid matter, escaped, at the expence of leaving those limbs behind them. Drops of clear water are sometimes also preserved in amber. These have doubtless been received into it while soft, and preserved by its hardening round them. Beautiful leaves of a pinnated structure, resembling some of the ferns, or maidenhairs, have been found in some pieces; but these are rare, and the specimens of great value. Mineral substances are also found at times lodged in masses of amber. Some of the pompous collections of the German princes boast of specimens of native gold and silver in masses of amber; but as there are many substances of the marcasite, and other kinds, that have all the glittering appearance of gold and silver, it is not to be too hastily concluded, that these metals are really lodged in these beds of amber. Iron is found in various shapes immersed in amber; and as it is often seen eroded, and sometimes in the state of vitriol, it is not impossible but that copper, and the other metals, may be also sometimes immersed in it in the same state: hence the bluish and greenish colours, frequently found in the recent pieces of amber, may be owing, like the particles

Amber. particles of the gem colours, to those metals; but as the gems, by their dense texture, always retain their colours, this lighter and more lax bitumen usually loses what it gets of this kind, by keeping some time. Small pebbles, grains of sand, and fragments of other stones, are not unfrequently also found immersed in amber.

Naturalists have been greatly divided as to the origin of this substance, and what class of bodies it belongs to; some referring it to the vegetable, others to the mineral, and some even to the animal kingdom. Pliny describes it as "a resinous juice, oozing from aged pines and firs, (others say from poplars, whereof there are whole forests on the coasts of Sweden), and discharged thence into the sea, where, undergoing some alteration, it is thrown, in this form, upon the shores of Prussia, which lie very low: he adds, that it was hence the ancients gave it the denomination *succinum*; from *succus*, juice."

Some suppose amber a compound substance. Prussia, say they, and the other countries which produce amber, are moistened with a bituminous juice, which mixing with the vitriolic salts abounding in those places, the points of those salts fix its fluidity, whence it congeals; and the result of that congelation makes what we call amber; which is more or less pure, transparent, and firm, as those parts of salt and bitumen are more or less pure, and are mixed in this or that proportion.

Mr Brydone, in his tour to Sicily and Malta, says, that the river Gearetta, formerly celebrated by the poets under the name of Simetus, throws up near its mouth great quantities of amber. He mentions also a kind of artificial amber, not uncommon there, made, as he was told, from copal, but very different from the natural.

According to Hartman, amber is formed of a bitumen, mixed with vitriol and other salts. But though this were allowed him in regard to the fossil amber, many dispute whether the sea-amber be so produced. It is, however, apparent, that all amber is of the same origin, and probably that which is found in the sea has been washed thither out of the cliffs; though Hartman thinks it very possible, that some of it may be formed in the earth under the sea, and be washed up thence. The sea-amber is usually finer to the eye than the fossil; but the reason is, that it is divested of that coarse coat with which the other is covered while in the earth.

Upon the whole, it seems generally agreed upon, that amber is a true bitumen of fossil origin.—In a late volume of the *Journal de Physique*, however, we find it asserted by Dr Girtanner to be an animal product, a sort of honey or wax formed by a species of large ant called by Linnæus *formica rufa*. These ants, our author informs us, inhabit the old pine forests, where they sometimes form hills about six feet in diameter; and it is generally in these ancient forests, or in places where they have been, that fossil amber is found. This substance is not hard as that which is taken up in the sea at Prussia, and which is well known to naturalists. It has the consistence of honey or of half melted wax, but it is of a yellow colour like common amber; it gives the same product by chemical analysis, and it hardens like the other when it is suffered to remain some time in a solution of common

salt. This accounts for the insects that are so often found inclosed in it. Among these insects ants are always the most prevailing; which tends farther, Mr Girtanner thinks, to the confirmation of his hypothesis. Amber then, in his opinion, is nothing but a vegetable oil rendered concrete by the acid of ants, just as wax is nothing but an oil hardened by the acid of bees; a fact incontestably proved, we are told, since Mr Metherie has been able to make artificial wax by mixing oil of olives with the nitrous acid, and which wax is not to be distinguished from the natural.

There are several indications which discover where amber is to be found. The surface of the earth is there covered with a soft scaly stone; and vitriol in particular always abounds there, which is sometimes found white, sometimes reduced into a matter, like melted glass, and sometimes figured like petrified wood.

Amber of the finest kind has been found in England. It is frequently thrown on the shores of Yorkshire, and many other places, and found even in our clay-pits; the pits dug for tile-clay, between Tyburn and Kensington gravel-pits, and that behind St George's Hospital at Hyde-park corner, have afforded fine specimens.

Poland, Silesia, and Bohemia, are famous for the amber dug up there at this time. Germany affords great quantities of amber, as well dug up from the bowels of the earth, as tossed about on the shores of the sea and rivers there. Saxony, Misnia, and Sweden, and many other places in this tract of Europe, abound with it. Denmark has afforded, at different times, several quantities of fossil amber; and the shores of the Baltic abound with it. But the countries lying on the Baltic afford it in the greatest abundance of all; and of these the most plentiful country is Prussia, and the next is Pomerania. Prussia was, as early as the times of Theodoric the Goth, famous for amber; for this substance coming into great repute with this prince, some natives of Prussia, who were about his court, offered their service to go to their own country, where that substance, they said, was produced, and bring back great stores of it. They accordingly did so; and from this time Prussia had the honour to be called the Country of Amber, instead of Italy, which had before undeservedly that title. This article alone brings his Prussian Majesty a revenue of 26,000 dollars annually. The amber of Prussia is not only found on the sea-coasts, but in digging; and though that of Pomerania is generally brought from the shores, yet people who dig, on different occasions, in the very heart of the country, at times find amber.

Junker describes, after Neumann, the Prussian amber-mines, which are the richest known.—First, at the surface of the earth is found a stratum of sand. Immediately under this sand is a bed of clay, filled with small flints of about an inch diameter each. Under this clay lies a stratum of black earth, or turf, filled with fossil wood, half decomposed, and bituminous; this stratum is extended upon a bank of minerals, containing little metal, except iron, which are consequently pyrites. Lastly, under this bed the amber is found, scattered about in pieces, or sometimes accumulated in heaps.

Amber has a subacid resinous taste, and fragrant aromatic smell, especially when dissolved. It differs from the other bituminous substances in this, that it yields by distillation a volatile acid salt, which none of the others do; otherwise it affords the same sort of principles

Amber.

Amber
||
Amber-
grease.

principles as them, viz. an acid phlegm, an oil which gradually becomes thicker as the distillation is continued; and when the operation is finished, there remains a black caput mortuum in the retort.—When boiled in water, it neither softens, nor undergoes any sensible alteration. Exposed to the fire in an open vessel, it melts into a black mass very like a bitumen: It is partly soluble in spirit of wine, and likewise in some essential oils; but it is with difficulty that the expressed ones are brought to act upon it; the stronger sorts of fixed alkaline lixivia almost totally dissolve it.

This substance is principally of two colours, white and yellow. The white is the most esteemed for medicinal purposes, as being the most odoriferous, and containing the greatest quantity of volatile salt; tho' the yellow is most valued by those who manufacture beads and other toys with it, by reason of its transparency.

Amber is the basis of all varnishes, by solution in the ways described under the article VARNISH.

Amber, when it has once been melted, irrecoverably loses its beauty and hardness. There have been some, however, who pretended they had an art of melting some small pieces of amber into a mass, and constituting large ones of them: but this seems such another undertaking as the making of gold; all the trials that have yet been made by the most curious experimenters, proving, that the heat which is necessary to melt amber, is sufficient to destroy it. Phil. Trans. N^o 248. p. 25.

Could amber indeed be dissolved without impairing its transparency, or one large mass be made of it by uniting several small ones, it is easy to see what would be the advantages of such a process. The art of embalming might possibly be also carried to a great height by this, if we could preserve the human corpse in a transparent case of amber, as the bodies of flies, spiders, grasshoppers, &c. are to a great perfection. Something of a substitute of this kind we have in fine rosin; which being dissolved by heat, and the bodies of small animals several times dipped in it, they are thus coated with colophony, that in some degree resembles amber; but this must be kept from dust.

Amber in substance has been much recommended as a nervous and cordial medicine; and alledged to be very efficacious in promoting the menstrual discharge, and the exclusion of the fœtus and secundines in labour: but as in its crude state it is quite insoluble by our juices, it certainly can have very little effect on the animal system, and therefore it is now seldom given in substance. The forms in which amber is prepared are, A tincture, a salt, and an oil; the preparation and uses of which are described in the proper place under the article PHARMACY.

AMBER-Tree, the English name of a species of ANTHOSPERMUM.

AMBERG, a city of Germany, the capital of the palatinate of Bavaria, with a good castle, ramparts, bastions, and deep ditches. It is seated near the confines of Franconia, on the river Wils. It drives a great trade in iron and other metals, found in the neighbouring mountains. E. Long. 12. 4. N. Lat. 20. 46.

AMBERGREASE, AMBERGRIFE, or GREY AMBER, in natural history, is a solid, opaque, ash-coloured,

fatty, inflammable substance, variegated like marble, remarkably light, rugged and uneven in its surface, and has a fragrant odour when heated. It does not effervesce with acids; it melts freely over the fire, into a kind of yellow rosin; and is hardly soluble in spirit of wine.

Amber-
grease.

It is found swimming upon the sea or the sea-coast, or in the sand near the sea-coast; especially in the Atlantic ocean, on the sea coast of Brasil, and that of Madagascar; on the coast of Africa, of the East-Indies, China, Japan, and the Molucca islands; but most of the ambergrife which is brought to England comes from the Bahama islands, from Providence, &c. where it is found on the coast. It is also sometimes found in the abdomen of whales by the whale-fishermen, always in lumps of various shapes and sizes, weighing from half an ounce to an hundred and more pounds. The piece which the Dutch East India Company bought from the king of Tydor, weighed 182 pounds. An American fisherman from Antigua found some years ago, about 52 leagues south-east from the Windward Islands, a piece of ambergrife in a whale, which weighed about 130 pounds, and sold for 500l. Sterling.

There have been many different opinions concerning the origin of this substance.

It has been supposed to be a fossil bitumen or naphtha, exuding out of the bowels of the earth in a fluid form, and distilling into the sea, where it hardens and floats on the surface. But having been frequently found in the belly of whales, it has by others been considered as entirely an animal production.

Clusius asserted it to be a phlegmatic recreation, or indurated indigestible part of the food, collected and found in the stomach of the whale, in the same manner as the BEZOARS are found in the stomach of other animals.

In an account communicated by Paul Dudley, Esq; in the 23d volume of the Philosophical Transactions, the ambergrife found in whales is represented as a kind of animal product, like musk, and castoreum, &c. secreted and collected in a peculiar bag or bladder, which is furnished with an excretory duct or canal, the spout of which runs tapering into and through the length of the penis; and that this bag, which lies just over the testicles, is almost full of a deep orange-coloured liquor, not quite so thick as oil, of the same smell as the balls of ambergrife, which float and swim loose in it: which colour and liquor may also be found in the canal of the penis; and that therefore ambergrife is never to be found in any female, but in the male only. But these circumstances are not only destitute of truth, but also contrary to the laws of the animal œconomy: For, in the first place, ambergrife is frequently found in females as well as males; although that found in females is never in such large pieces, nor of so good a quality, as what is found in males. Secondly, No person who has the least knowledge in anatomy or physiology, will ever believe that organised bodies, such as the beaks of the Sepia, which are so constantly found in ambergrife taken out of the whale, can have been absorbed from the intestines by the lacteals or lymphatics, and collected with the ambergrife in the precluded bag above-mentioned.

Kæmpfer, who has given us so many other faithful accounts in natural history, seems to come nearer the truth

Amber-
grease.

truth with regard to the origin of Ambergrise, when he says, that it is the dung of the whale; and that the Japanese, for this reason, call it *kusura no suu*, i. e. whale's dung. This account, however, though founded on observation, has never obtained credit, but has been considered rather as a fabulous story, with which the Japanese imposed upon him, who had himself no direct observation to prove the fact.

This matter, therefore, remained a subject of great doubt; and it was generally thought to be more probable, that ambergrise, after having been swallowed, and somehow or other changed in the stomach and bowels of the whale, was found among its excrements.

But the most satisfactory account of the real origin of ambergrise, is that given by Dr Swedjar in the 73d volume of the Philosophical Transactions, art. 15.

We are told by all writers on ambergrise, that sometimes claws and beaks of birds, feathers of birds, parts of vegetables, shells, fish, and bones of fish, are found in the middle of it, or variously mixed with it. Of a very large quantity of pieces, however, which the Doctor examined, he found none that contained any such thing; though he allows, that such substances may sometimes be found in it: but in all the pieces of any considerable size, whether found on the sea or in the whale, he constantly found a considerable quantity of black spots, which, after the most careful examination, appeared to be the beaks of the *SEPIA OCTOPEDIA*; and these beaks, he thinks, might be the substances which have hitherto been always mistaken for claws or beaks of birds, or for shells.

The presence of these beaks in ambergrise proves evidently, that all ambergrise containing them is in its origin, or must have been once, of a very soft or liquid nature, as otherwise those beaks could not so constantly be intermixed with it throughout its whole substance.

That ambergrise is found either upon the sea and sea-coast, or in the bowels of whales, is a matter of fact universally credited. But it has never been examined into and determined, whether the ambergrise found upon the sea and sea-coast is the same as that found in the whale, or whether they are different from one another? Whether that found on the sea or sea-coast has some properties, or constituent parts, which that found in the whale has not? And lastly, Whether that found in the whale is superior or inferior in its qualities and value to the former?

It is likewise a matter of consequence to know, Whether ambergrise is found in all kinds of whales, or only in a particular species of them? Whether it is constantly and always to be met with in those animals? And, if so, in what part of their body it is to be found?

All these questions we find very satisfactorily discussed by Dr Swedjar.

According to the best information that he could obtain from several of the most intelligent persons employed in the spermaceti whale-fishery, and in procuring and selling ambergrise, it appears, that this substance is sometimes found in the belly of the whale, but in that particular species only which is called the *spermaceti whale*, and which from its description and delineation appears to be the *PHYSETER Macrocephalus* Linnæi.

The New England fishermen, according to their account, have long known that ambergrise is to be found

in the spermaceti whale; and they are so convinced of this fact, that whenever they hear of a place where ambergrise is found, they always conclude that the seas in that part are frequented by this species of whale.

The persons who are employed in the spermaceti whale-fishery, confine their views to the *Physeter macrocephalus*. They look for ambergrise in all the spermaceti whales they catch, but it seldom happens that they find any. Whenever they hook a spermaceti whale, they observe, that it constantly not only vomits up whatever it has in its stomach, but also generally discharges its fæces at the same time; and if this latter circumstance takes place, they are generally disappointed in finding ambergrise in its belly. But whenever they discover a spermaceti whale, male or female, which seems torpid and sickly, they are always pretty sure to find ambergrise, as the whale in this state seldom voids its fæces upon being hooked. They likewise generally meet with it in the dead spermaceti whales, which they sometimes find floating on the sea. It is observed also, that the whale, in which they find ambergrise, often has a morbid protuberance; or, as they express it, a kind of gathering in the lower part of its belly, in which, if cut open, ambergrise is found. It is observed, that all those whales, in whose bowels ambergrise is found, seem not only torpid and sick, but are also constantly leaner than others; so that, if we may judge from the constant union of these two circumstances, it would seem that a larger collection of ambergrise in the belly of the whale is a source of disease, and probably sometimes the cause of its death. As soon as they hook a whale of this description, torpid, sickly, emaciated, or one that does not dung on being hooked, they immediately either cut up the above-mentioned protuberance, if there be any, or they rip open its bowels from the orifice of the anus, and find the ambergrise, sometimes in one sometimes in different lumps, of generally from three to twelve and more inches in diameter, and from one pound to twenty or thirty pounds in weight, at the distance of two, but most frequently of about six or seven feet from the anus, and never higher up in the intestinal canal; which, according to their description, is, in all probability, the intestine cæcum, hitherto mistaken for a peculiar bag made by nature for the secretion and collection of this singular substance. That the part they cut open to come at the ambergrise is no other than the intestinal canal is certain, because they constantly begin their incision at the anus, and find the cavity every where filled with the fæces of the whale, which from their colour and smell it is impossible for them to mistake. The ambergrise found in the intestinal canal is not so hard as that which is found on the sea or sea-coast, but soon grows hard in the air: when first taken out it has nearly the same colour, and the same disagreeable smell, though not so strong, as the more liquid dung of the whale has; but, on exposing it to the air, it by degrees not only grows greyish, and its surface is covered with a greyish dust like old chocolate, but it also loses its disagreeable smell, and, when kept for a certain length of time, acquires the peculiar odour which is so agreeable to most people.

The gentlemen the Doctor conversed with confessed that if they knew not from experience that ambergrise thus found will in time acquire the above-mentioned

qua-

Amber-
grease.

Ambergrease. qualities, they would by no means be able to distinguish ambergrise from hard indurated fæces. This is so true, that whenever a whale voids its fæces upon being hooked, they look carefully to see if they cannot discover among the more liquid excrements (of which the whale discharges several barrels) some pieces floating on the sea, of a more compact substance than the rest; these they take up and wash, knowing them to be ambergrise.

In considering whether there be any material difference between ambergrise found upon the sea or sea-coast, and that found in the bowels or among the dung of the whale, the Doctor refutes the opinion, that all ambergrise found in whales is of an inferior quality, and therefore much less in price. Ambergrise, he observes, is only valued for its purity, lightness, compactness, colour, and smell. There are pieces of ambergrise found on different coasts, which are of a very inferior quality; whereas there are often found in whales pieces of it of the first value; nay, several pieces found in the same whale, according to the above-mentioned qualities, are more or less valuable. All ambergrise found in whales has at first when taken out of the intestines very near the same smell as the liquid excrements of that animal have; it has then also nearly the same blackish colour: they find it in the whale sometimes quite hard, sometimes rather softish, but never so liquid as the natural fæces of that animal. And it is a matter of fact, that, after being taken out and kept in the air, all ambergrise grows not only harder and whiter, but also loses by degrees its smell, and assumes such an agreeable one, as that in general has which is found swimming upon the sea; therefore the goodness of ambergrise seems rather to depend on its age. By being accumulated after a certain length of time in the intestinal canal, it seems even then to become of a whiter colour, and less ponderous, and acquire its agreeable smell. The only reason why ambergrise found floating on the sea generally possesses the above-mentioned qualities in a superior degree, is because it is commonly older, and has been longer exposed to the air. It is more frequently found in males than females; the pieces found in females are in general smaller, and those found in males seem constantly to be larger and of a better quality; and therefore the high price in proportion to the size is not merely imaginary for the rarity-sake, but in some respect well founded, because such large pieces appear to be of a greater age, and possess the above-mentioned qualities in general in a higher degree of perfection than smaller pieces.

It is known, that the *Sepia octopodia*, or cuttle-fish, is the constant and natural food of the *spermaceti* whale, or *Phyfeter macrocephalus*. Of this the fishers are so well persuaded, that whenever they discover any recent relics of it swimming on the sea, they conclude that a whale of this kind is, or has been, in that part. Another circumstance which corroborates the fact is, that the *spermaceti* whale on being hooked generally vomits up some remains of the *Sepia*. Hence it is easy to account for the many beaks, or pieces of beaks, of the *Sepia* found in all ambergrise. The beak of the *Sepia* is a black horny substance, and therefore passes undigested through the stomach into the intestinal canal, where it is mixed with the fæces; after which it is either evacuated with them, or if these latter be preter-

naturally retained, forms concretions with them, which render the animal sick and torpid, and produce an obstipation, which ends either in an abscess of the abdomen, as has been frequently observed, or becomes fatal to the animal; whence in both the cases, on the bursting of its belly, that hardened substance, known under the name of *ambergrise*, is found swimming on the sea, or thrown upon the coast.

From the preceding account, and his having constantly found the above-mentioned beaks of the *Sepia* in all pieces of ambergrise of any considerable size, Dr Swedjar concludes with great probability, that all ambergrise is generated in the bowels of the *Phyfeter macrocephalus*, or *spermaceti* whale; and there mixed with the beaks of the *Sepia octopodia*, which is the principal food of that whale. He therefore defines ambergrise to be the preternaturally hardened dung or fæces of the *Phyfeter macrocephalus*, mixed with some indigestible relics of its food.

The use of ambergrise in Europe is now nearly confined to perfumery, though it has formerly been recommended in medicine by several eminent physicians. Hence the *Essentia Ambraë Hoffmanni*, *Tinctura Regia Cod. Parisini*, *Trochisci de Ambra Ph. Wurtemberg, &c.*

If we wish to see any medicinal effects from this substance, the Doctor observes, we must certainly not expect them from two or three grains, but give rather as many scruples of it for a dose: though even then, he thinks, there would not be reason to expect much effect from it, as he had himself taken of pure unadulterated ambergrise in powder 30 grains at once, without observing the least sensible effect from it. A sailor, however, who had the curiosity to try the effect of recent ambergrise upon himself, took half an ounce of it melted upon the fire, and found it a good purgative; which proves that it is not quite an inert substance.

In Asia and part of Africa ambergrise is not only used as a medicine and as a perfume; but considerable use is also made of it in cookery, by adding it to several dishes as a spice. A great quantity of it is also constantly bought by the pilgrims who travel to Mecca; probably to offer it there, and make use of it in fumigations, in the same manner as frankincense is used in Catholic countries. The Turks make use of it as an aphrodisiac. Our perfumers add it to scented pillars, candles, balls, or bottles, gloves, and hair-powder; and its essence is mixed with pomatums for the face and hands, either alone or mixed with musk, &c. tho' its smell is to some persons extremely offensive.

Ambergrise may be known to be genuine by its fragrant scent when a hot needle or pin is thrust into it, and its melting like fat of an uniform consistence; whereas the counterfeit will not yield such a smell, nor prove of such a fat texture.—One thing, however, is very remarkable, that this drug, which is the most sweet of all the perfumes, should be capable of being resembled in smell by a preparation of one of the most odious of all stinks. Mr Homberg found, that a vessel in which he had made a long digestion of the human fæces, acquired a very strong and perfect smell of ambergrise, inasmuch that any one would have thought a great quantity of essence of ambergrise had been made in it. The perfume was so strong and offensive, that the vessel was forced to be removed out of the laboratory.

Ambert
||
Ambigenal

AMBERT, a small town of France, in Lower Auvergne, the chief place of a small territory called *Livradois*. It is remarkable for its paper-manufactory and camblets. E. Long. 3. 35. N. Lat. 45. 28.

AMBETTUWAY, in botany, a barbarous name of a tree, the leaves of which, when boiled in wine, are said to create an appetite, and is used by the people in Guinea with that intention.

AMBIANI, or AMBIANENSIS CIVITAS, now *Amiens*, a city of Picardy. It is called *Samarobriva* by Cæsar and Cicero; which, according to Valesius, signifies the bridge of the *Samara*, or *Somme*. *Ambiani* is a later name, taken from that of the people, after the usual manner of the lower age.

AMBIDEXTER, a person who can use both hands with the same facility, and for the same purposes, that the generality of people do their right hands.—As to the natural cause of this faculty, some, as Hæfer, attribute it to an extraordinary supply of blood and spirits from the heart and brain, which furnish both hands with the necessary strength and agility; others, as Nicholas Massa, to an erect situation of the heart, inclining neither to the right hand nor left; and others to the right and left subclavian arteries being of the same height, and the same distance from the heart, by which the blood is propelled with equal force to both hands.—But these are only conjectures, or rather chimeras. Many think, that, were it not for education and habit, all mankind would be ambidexters; and, in fact, we frequently find nurses obliged to be at a good deal of pains before they can bring children to forego the use of their left hands. How far it may be an advantage to be deprived of half our natural dexterity, may be doubted. It is certain, there are infinite occasions in life, when it would be better to have the equal use of both hands. Surgeons and oculists are of necessity obliged to be ambidexters; bleeding, &c. in the left-arm or left-ankle, and operations on the left-eye, cannot be well performed but with the left-hand.—Various instances occur in history, where the left-hand has been exercised preferably to the right. But by the laws of the ancient Scythians, people were enjoined to exercise both hands alike; and Plato enjoins ambidexterity to be observed and encouraged in his republic.

AMBIDEXTER, among English lawyers, a juror or embracer, who accepts money of both parties, for giving his verdict; an offence for which he is liable to be imprisoned, for ever excluded from a jury, and to pay ten times the sum he accepted of.

AMBIENT, a term used for such bodies, especially fluids, as encompass others on all sides: thus, the air is frequently called an ambient fluid, because it is diffused round the earth.

AMBIGENÆ OVES, in the heathen sacrifices, an appellation given to such ewes as, having brought forth twins, were sacrificed, together with their two lambs, one on each side. We find them mentioned among other sacrifices to Juno.

AMBIGENAL HYPERBOLA, a name given by Sir Isaac Newton to one of the triple hyperbolas of the second order, having one of its infinite legs falling within an angle formed by the asymptotes, and the other without.

VOL. I. Part II.

AMBIGUITY, a defect of language, whereby words are rendered ambiguous. See the next article.

AMBIGUOUS, a term applied to a word or expression which may be taken in different senses.—An anonymous writer has published a dictionary of ambiguous words: *Lexicon Philosophicum de Ambiguitate Vocabulorum*, Francof. 1597, 4to.—The responses of the ancient oracles were always ambiguous.

AMBIT, in geometry, is the same with what is otherwise called the perimeter of a figure. See PERIMETER.

AMBIT was particularly used, in antiquity, to denote a space of ground to be left vacant betwixt one building and another. By the laws of the twelve tables, houses were not to be built contiguous, but an ambit or space of 2½ feet was to be left about each for fear of fire.—The ambitus of a tomb or monument denoted a certain number of feet, in length and breadth, around the same, within which the sanctity assigned to it was limited. The whole ground wherein a tomb was erected was not to be secreted from the common uses; for this reason, it was frequent to inscribe the ambit on it, that it might be known how far its sanctity extended: thus, *in fronte pedes tot, in agrum pedes tot*.

AMBITION (*ambitio*) is generally used in a bad sense, for an immoderate or illegal pursuit of power.

In the strict meaning, however, of the word, it signifies the same with the *ambitus* of the Romans. See the next article.

Ambition, in the former and more usual sense, is one of those passions that is never to be satisfied. It swells gradually with success; and every acquisition serves but as a spur to further attempts.

“If a man (it has been well observed) could at once accomplish all his desires, he would be a miserable creature; for the chief pleasure of this life is to wish and desire. Upon this account, every prince who aspires to be despotic aspires to die of weariness. Searching every kingdom for the man who has the least comfort in life, Where is he to be found?—In the royal palace.—What! his Majesty? Yes; especially if he be despotic.”

AMBITUS, in Roman antiquity, the setting up for some magistracy or office, and formally going round the city to solicit the interest and votes of the people.

Ambitus differed from *ambition*, as the former lies in the act, the latter in the mind.

Ambitus was of two kinds; one lawful, the other infamous. The first, called also *ambitus popularis*, was when a person offered his service to the republic frankly, leaving it to every body to judge of his pretensions as they found reasonable. The means and instruments here made use of were various. 1. *Amici*, or friends, under different relations, including *cognati, affines, necessarii, familiares, vicini, tribules, clientes, municipes, sodales, collegæ*. 2. *Nomenclatura*, or the calling and saluting every person by his name; to which purpose, the candidates were attended with an officer, under the denomination of *interpres*, or *nomenclator*. 3. *Blanditia*, or obliging persons, by serving them, or their friends, patrons, or the like, with their vote and interest on other occasions. 4. *Prensatio*, the shaking every person by the hand, offering him his service, friendship,

Amble friendship, &c.—The second kind was that wherein force, cajoling, money, or other extraordinary influence, was made use of. This was held infamous, and severely punished, as a source of corruption and other mischiefs.

||
Ambohit-
mene.

Ambitus was practised, not only at Rome and in the forum, but in the meetings and assemblies of other towns in Italy, where numbers of citizens were usually found, on account of trade and business.—The practice ceased in the city from the time of the emperors, by reason posts were not then to be had by courting the people, but by favour from the prince.

Persons who had causes depending practised the same, going about among the judges to implore their favour and mercy. They who practised this were called *Ambitiosi*. Hence we also meet with *ambitiosa decreta*, and *ambitiosa iusta*, used for such sentences and decrees as were thus procured from the judges, contrary to reason and equity, either gratuitously or for money.

AMBLE in horsemanship, a peculiar pace by which a horse's two legs of the same side move at the same time. See **HORSEMANSHIP**.

AMBLESIDE, a town in Westmoreland, seated at one end of Winandermeer, W. Long. 0. 49. N. Lat. 54. 30.

AMBLETEUSE, a sea-port town of France, in Picardy, defended with a battery of cannon. E. Long. 1. 30. N. Lat. 49. 40.

AMBLYGON, in geometry, denotes an obtuse-angled triangle, or a triangle one of whose angles consists of more than 90 degrees.

AMBLYOPY, among physicians, signifies an obscuration of the sight, so that objects at a distance cannot be clearly distinguished.

AMBO, or **AMBON**, a kind of pulpit or desk, in the ancient churches, where the priests and deacons stood to read or sing part of the service, and preach to the people; called also *Analogium*. The term is derived from *αναβαίνω*, "to mount."—The ambo was mounted upon two sides; whence some also derive the appellation from the Latin *ambo*, "both."

The ambo was ascended by steps; which occasioned that part of the office performed there to be called the *Gradual*. See **GRADUAL**.

Besides the gospel, which was read at the top of the ambo, and the epistle, which was read a step lower, they likewise published from this place the acts of the martyrs, the commemoration of departed saints, and the letters of peace and communion sent by one church to another: here, too, converts made a public profession of their faith; and bishops, their defence, when accused: treaties also were sometimes concluded, and the coronations of emperors and kings performed, in the same place.

The modern reading-desks and pulpits have been generally substituted to the ancient Ambos; though, in some churches, remains of the ambos are still seen. In that of St John de Lateran at Rome, there are two moveable ambos.

AMBOHITSMENE, or **VOHITSANGHOMBE**, a province of the island of Madagascar, so called from some red mountains of the same name, lying in S. Lat. 20°. These mountains are very high, resembling the

Tafelberg of the Cape of Good Hope. On one side of this ridge the sea extends into the country for fifteen leagues; on the other is a flat country, abounding in ponds and marshes. Here is also a lake fifteen leagues in length, and the same in breadth, containing many small islands. The inhabitants of the mountains are called *Zaferahongs*; and have plenty of gold, iron, cattle, silk, &c.

Amboise
||
Amboyna.

AMBOISE, a town of France, in Touraine, seated at the confluence of the rivers Loire and Masee. The town is mean and ill built; but has been rendered famous in history by the conspiracy of the Protestants in 1560, which opened the fatal wars of religion in France. The castle is situated on a craggy rock, extremely difficult of access, and the sides of which are almost perpendicular. At its foot flows the Loire, which is divided into two streams by a small island. To this fortress the duke of Guise, when he expected an insurrection among the Hugonots, removed Francis II. as to a place of perfect security. Only two detached parts of the ancient castle now remain, one of which was constructed by Charles VIII. and the other by Francis I. The former of those princes was born and died at Amboise. The town is situated E. Long. 1. 30. N. Lat. 47. 25.

AMBOULE, a province of Madagascar, somewhat to the northward of S. Lat. 23°. It is a fertile and agreeable country, watered by the river Manampani, whose mouth lies in S. Lat. 23. 30. The country produces plants and fruits in plenty. Iron mines are also found here. The black cattle are extremely fat, and their flesh excellent. In this province stands a large town of the same name; near which is a fountain of hot water, within 20 feet of a small river whose sand is almost burning. The water of the fountain is said to boil an egg hard in two hours; and the inhabitants affirm it to be a sovereign remedy against the gout. The people here are employed in different preparations of iron and steel, which they have from their own mines, and forge several instruments with tolerable skill. Their governor is honoured with the title of *Rabertau*, or *Great Lord*. He exercises sovereign authority and absolute power; but is frequently, in times of distress, surprised by his subjects, who assemble in great numbers, seize his person, and threaten him with death unless they are relieved. To extricate himself from this dilemma, he is instantly obliged to issue orders for distributing provisions among them; but is usually repaid with interest, a quadruple return being made in a plentiful harvest. The people of Amboule live in great licentiousness with their superiors, and their country is generally a retreat for the roguish and lazy.

AMBOYNA, one of the Molucca islands, in the East Indies. It lies in S. Lat. 3. 36. and E. Long. 126. 20. and is remarkable for being the centre of the commerce for nutmegs and cloves, which is entirely monopolized by the Dutch East-India company. It is about 24 leagues in circumference. Besides cloves, it likewise abounds in most of the tropical fruits and fish; nor is there here any deficiency of good water; but flesh is very scarce. This scarcity, however, proceeds more from the policy of the Dutch than either the intemperance of the climate, or the barrenness of the soil: For, excepting cloves, they have in Amboyna,

Amboyna. na, as well as the Moluccas, industriously discouraged the cultivation of every esculent commodity, with the view of with-holding subsistence from those who might be tempted to invade them.

Of the natives, the men wear large whiskers, but leave little hair upon their chin; and have only a slight piece of stuff wrapped round their middle. The women tie their hair in knots: the maids are bought of their fathers before they are married; and if the wife proves barren, the marriage is dissolved. Some of the natives are Mahometans, and some Christians: but they are all said to be lazy, deceitful, and treacherous. They make war with small swift vessels, in shape like dragons with regard to the head and tail. Their houses are built of bamboo-canes and sago-trees. They sleep on mats. Their weapons are bows and arrows, javelins, scymitars, and targets.

Amboyna was first discovered by the Portuguese, who built a fort upon it, which was taken from them by the Dutch in 1605. They did not, however, become masters of the whole island at once. The English had here five factories, which lived under the protection of the Dutch castle; holding themselves safe, in respect of the friendship between the two nations. Great differences had arisen between the Dutch and English colonists in this part of the world; till at last, the English East-India company applying to King James, a treaty was concluded in 1619, by which the concerns both of the English and Dutch were regulated, and certain measures agreed upon for preventing future disputes. This was an additional security to the English; and, by virtue of the treaty, they continued two years in Amboyna, trading with the Dutch. During this time, however, several disputes happened; which occasioning mutual discontents, the complaints were sent to Jaccatra, in the island of Java Major, to the council of defence of both nations there residing: but they not agreeing, a state of the matter was sent over to Europe, to be decided by the East-India companies of both nations; or, in case they could not agree, by the King of England and the States of Holland, according to an article in the treaty of 1619.—But before these disputes could be decided in a legal way, the Dutch, in order to give the more specious colouring to the violent seizure which they meditated of the island of Amboyna, made use of the stale pretext of a conspiracy being formed by the English and Japanese to dispossess them of one of their forts in this place. The plot, it was alledged, had been confessed by a Japanese and Portuguese in the English service, who were most inhumanly tortured till they should answer in the affirmative such interrogatories as might favour the secret design of those cruel inquisitors. Upon the injurious evidence of this constrained declaration, they immediately accused the English factors of the pretended conspiracy. Some of them they imprisoned, and others they loaded with irons, and sent on board their ships; seizing at the same time all the English merchandize, with their writings and books.

These acts of violence were followed by a scene of horror unexampled in the punishment of the most atrocious offenders. Some of the factors they tortured, by compelling them to swallow water till their bodies were distended to the utmost pitch; then taking the miserable victims down from the boards to which they

had been fastened, and causing them to disgorge the water; if they did not acknowledge the imputed guilt, the process of torture was repeated. Others of the English they consumed by burning them gradually from the feet upwards, in order to extort the confession of a conspiracy, which was only pretended by the infernal policy of those savage tormentors. Some had the nails of the fingers and toes torn off; and in some they made holes in their breasts, filling the cavities with inflammable materials, to which they afterwards put fire. Those who did not expire under the agonies of torture were consigned to the hands of the executioner.

The allegation of this pretended conspiracy was equally void of probability and truth. The Dutch had a garrison of 300 men in the fort, besides the burghers in the town, and several other forts and garrisons in the island, while the number of the English did not amount to 20 men; nor were even those provided with arms or ammunition to effect such a design as that with which they were charged. There likewise was not one English vessel in the harbour, whereas the Dutch had eight ships riding near the town: neither, when the Dutch broke open the desks and trunks of the factors, was there found a single paper or letter which could be construed into the most distant relation to any conspiracy. Add to all this, that such of the unhappy sufferers as could speak to be heard, declared in the most solemn manner their innocence of the plot with which they were charged.

The whole of the transaction affords the most irrefragable testimony, that it was founded entirely upon a political fiction of the Hollanders, who had themselves formed the design of monopolizing the trade of the Spice Islands; for the accomplishment of which they perpetrated, about the same time, a similar tragedy at Pooleron, where they put to the torture 162 of the natives, whom they likewise charged with a pretended conspiracy. It may justly be reckoned singular in the fortune of this commercial republic, that they have ever since been permitted to enjoy in peace those invaluable islands, which were originally obtained by such atrocious infringements of humanity and the laws of nations, as will stain the Dutch annals, to the latest ages, with indelible infamy.

The more effectually to preserve this trade, the Dutch have had all the clove-trees in the adjacent islands grubbed up. Sometimes also, when the harvest is very large, part of the produce of Amboyna itself is burnt.—To prevent the rearing of cloves in any of the neighbouring islands, or the inhabitants from selling them to strangers, the governor of Amboyna makes the tour of his government with a fleet of curricuries, consisting sometimes of 20, and at others of 30, 40, or 50 sail. This expedition is made with all the pomp imaginable, in order to gratify the pride and folly of the Indian chiefs. The true reason of their taking all this pains is, because experience has shown, that no contracts, however solemn, can prevent the inhabitants of those islands from selling their spice to strangers; and even now, frauds are so frequently practised by the Dutch themselves, though the company is inexorable in punishing them, that the common people call the cloves *galken-kruid*, that is, the gallows-spice.

Besides the cloves, coffee is also cultivated here by

Ambracia, the Dutch, and a gold mine has been lately found out. This was discovered by the quantities of gold-dust that were washed from some mountains by the torrents. Here also grow several kinds of valuable wood, of which they make tables, chairs, escritoirs, &c. for the principal persons in the government; and the rest is sold all over the Indies at a very extravagant rate.

Amboyna is divided into two parts, viz. a greater and lesser peninsula. The former, called *Hiton*, is 12 leagues in length, and two and a half broad. In this the Dutch have no less than five forts, or rather strong redoubts, mounted with cannon. The other is called *Leytimor*, five leagues in length, and one and a half broad, which is the southern part of the island; on this stands the fort of *Victoria*, which is the residence of the governor, and his council, composed of 15 gentlemen or merchants. The fortress is a square, the ramparts mounted with 60 pieces of brass cannon, and the garrison usually composed of 600 men. It is so strong by nature and art, as to be in a manner impregnable; and so effectually does it command the harbour, that no vessel could come in or go out without being sunk by the cannon, if the governor chose. The inhabitants of Amboyna are computed at 70 or 80,000, of whom but a small number are Dutch; and this obliges the latter to be continually upon their guard, and to keep a competent number of troops in each of their forts, particularly in that of *Middleburgh*, which stands upon the isthmus that connects these peninsulas. There are also redoubts and garrisons in all the islands of this government.

AMBRACIA, one of the most considerable cities of ancient Epirus, situated on the river *Araëthus*, at a small distance from the sea. At first it was a free city; but was afterwards reduced by the *Æacidæ* kings of Epirus, who chose it for the place of their residence. In process of time, the *Ætolians* made themselves masters of it, and held it till the year before Christ 189, when it fell into the hands of the Romans.

At this time Ambracia was a place of great strength. It was defended on one side by the river *Araëthus*, and on the other by steep and craggy hills; and surrounded with an high and thick wall, above three miles in compass. The Roman consul *Fluvius* began the siege by forming two camps, separated by the river, but with a communication between them; the Romans were posted in one, and the Epirots, their allies, in the other. He then threw up two lines, one of circumvallation, and the other of contravallation; and built a wooden tower, in form of a castle, over against the citadel, which stood on a hill. The *Ætolians*, however, before the lines were quite finished, found means to throw about 1000 men into the place.

The lines being completed, the city was attacked in five different places at once. The battering-rams shook the walls on all sides; and the Romans, from their moveable towers, pulled down the battlements with a kind of sythes, which they fastened to long beams. The besieged made a vigorous defence. They were night and day on the walls, and indefatigable in preventing the effects of the rams and sythes. The strokes of the former they deadened, by letting down beams, large stones, lumps of lead, &c. by means of pulleys, upon them when they were in motion; the others they rendered useless,

by pulling the beams to which they were fastened into the city with hooks contrived for the purpose.

While *Fluvius* was carrying on the siege, *Nicander*, the *Ætolian* prætor, found means to throw 500 men into the city, under the command of one *Nicodamus*, with whom *Nicander* agreed to attack the Roman camp in the night-time; not doubting, that, if the garrison from within, and the army from without, fell upon them at the same time, they would be obliged to raise the siege. *Nicodamus* narrowly watched the time at which he was ordered to sally; and though *Nicander* did not appear, marched out at the head of the garrison, armed with fire-brands and torches. The Roman centinels, surprised at this sight, ran to wake the legionaries, and soon spread a general alarm all over the camp. The legionaries marched in small bodies as they happened to meet, to repulse the enemy, whom they engaged in three different places. Two parties of the garrison were driven back: but the third, commanded by two *Ætolian* generals, made a great slaughter of the Romans; and, not finding themselves seconded by *Nicander*, retired in good order into the city.

Though the besieged were thus abandoned, and had no hopes of assistance, they continued to defend themselves with incredible vigour and resolution. The Romans had no sooner made a breach in the wall, but it was repaired, and a new one built behind it. The consul, therefore, altered his measures; and, instead of making breaches with the ram, began to undermine the wall, in hopes of throwing down great part of it at once, and entering the city before the besieged could have time to build a new wall. The miners being covered, were not observed by the garrison, till the great quantities of earth brought out of the mine gave the alarm. The *Ætolians* immediately began to counter-mine; and having dug a trench of the depth they supposed the mine to be, they carried it along the wall where they heard the strokes of the pick-axes of the Romans. When the two mines met, a battle ensued, first with pick-axes and spades, and then with swords and spears: but this attack did not last long, each party making themselves a kind of rampart with the loose earth. The *Ætolians*, in order to drive their enemies quite out of the mine, invented a machine, which they brought to the place where the two mines met: this was an hollow vessel with an iron bottom, bored through in many places, and armed with spikes at proper distances, to prevent the enemy from approaching it: this vessel they filled with feathers, which they set on fire, and with bellows driving the smoke on the besiegers, obliged them to leave the mine, half-suffocated. This interval the *Ætolians* made use of in repairing the foundations of the wall.

The vigorous resistance made by the Ambracians, however, did not raise the courage of the nation in general, who were determined on a peace with Rome at all events. *Fluvius*, in the mean time, being desirous of getting possession of Ambracia before the conclusion of the peace, employed *Amynder*, king of the *Athamans*, to persuade the inhabitants to surrender. As *Amynder* had great interest in Ambracia, having long resided there, he easily persuaded them to capitulate on the following terms, viz. That the *Ætolian* garrison should have leave to march out of the city; that the inhabitants

Ambreada inhabitants should pay 500 talents, 200 down, and the rest at six equal payments: and that they should deliver to the consul all the prisoners and deserters that were in the city. The gates were then opened to Flavius; and he was presented with a crown of gold, together with many fine statues and pictures, of which there were great numbers in the city, it having been the capital of Pyrrhus, who had enriched it with many valuable monuments.

From this time the city of Ambracia made no figure in history. It is scarce known at present where the city stood; but that called *Arba*, in upper Albania, seems best to agree with what is said of the ancient situation of this city. The river *Araethus*, on which Ambracia was situated, is now called, by the natives, *Spagmagmuris*.

AMBREADA, thus they call the false or factitious amber, which the Europeans use in their trade with the negroes on the coast of Africa, and particularly on the river Senegal. There are some large and red pieces of it, a thousand of which making twenty ropes or strings, weigh three pounds. There are others small, and also red, which weigh but two pounds and a half.

AMBRESBERRY, a market-town in Wiltshire, about six miles north of Salisbury, and situated in W. Long. 1. 40. and N. Lat. 51. 20.

AMBRONES, a Gaulish people who lived near the foot of the Alps, between Switzerland and Provence. They invaded the Roman territories in conjunction with the Cimbri and Teutones; but were defeated with great slaughter by Marius, about 101 years before Christ. Their women, who had staid during the engagement in a kind of fortification made with their carts, on seeing their husbands flying, and the Romans at their heels, armed themselves with axes, and, gnashing with their teeth, fell with fury on the pursuers and the pursued. Their first rage being spent, they desired to surrender themselves, upon the single condition, that their chastity should not be violated; but this equitable request being denied, they first killed their children, and then themselves, not one remaining alive out of the whole multitude.

AMBROSE-ISLAND, a small island laid down in some of the most approved charts, and particularly mentioned in Mr Robertson's Elements of Navigation, as lying in S. Lat. 25. 30. W. Long. 82. 20. It was searched for, however, in 1767, by Captain Carteret, with such diligence, that he concludes it to have no existence, as he could not discover land any where near that place.

AMBROSE (St), bishop of Milan, one of the most eminent fathers of the fourth century, born in Gaul in the year 333, according to Dr Cave, or in 340, as Mr Du Pin affirms. His father was at this time *præfectus prætorio* in Gaul; and resided at Arles, the capital of Gallia Narbonensis. The birth of Ambrose is said to have been followed with a remarkable presage of his future eloquence; for we are told, that a swarm of bees came and settled upon his mouth as he lay in his cradle. He soon made himself master of the several parts of secular learning; and pleaded causes before Probus with so much eloquence, that he was appointed his assessor, and soon after governor of the provinces of Liguria and Æmilia. He settled at Milan; where, in the year 374, upon the death of Auxentius bishop of

that city, there being a great contest between the Catholics and Arians concerning the choice of a new bishop, Ambrose thought it his duty, as governor, to go to the church, in order to compose the tumult. He accordingly addressed himself to the people in a gentle pathetic speech, exhorting them to proceed to their choice in a calm and friendly manner: while he was speaking to them, the whole assembly cried out with one voice, "Let Ambrose be bishop!" Such a sudden and unexpected incident surprised him extremely; so that he retired immediately, and used every method to divert them from their resolution of choosing him: but at last he was obliged to comply; and was baptised (being but a catechumen before), and ordained bishop, towards the latter end of the year 374, or beginning of 375. About the year 377, the barbarous nations making an incursion into the Roman empire, he fled to Illyricum, and afterwards to Rome. In the year 384, he was sent to the tyrant Maximus, who had usurped the empire and prevailed upon him not to pass over into Italy. The heathens being encouraged by these intestine commotions in the empire, attempted to restore their religion, and employed Q. Aurelius Symmachus, prefect of Rome, a man of great eloquence, to plead their cause. This gave rise to the famous contest between St Ambrose and him, about repairing the altar of Victory. But Symmachus having lost his cause, was expelled the city, and commanded not to approach within an hundred miles of it. The petition which he presented to the emperor Valentinian the younger, is still extant; we find in it the strongest figures of rhetoric and the greatest force of eloquence. St Ambrose wrote a confutation of this petition; but he has been thought guilty of many paralogisms: and yet he protests, "that he endeavoured only after the solidity of reasoning, leaving Symmachus all the glory of eloquence and politeness; it being (says he) the peculiar privilege of the pagan philosophers to amuse the mind with colours as false as their idols; and to say great things, not being capable of saying true ones." Ambrose met with a good deal of opposition from the Arians, against whom he acted with great spirit and intrepidity. Justina the empress and mother of Valentinian, who was an Arian, resolving to restore Arianism at Milan, began with demanding of St Ambrose one of the churches, which was called the Portian church: but he refused it; and the people surrounding the palace in a body, she was obliged to leave him in possession of his church, and even desire him to pacify the people.

Ambrose was a second time sent to the tyrant Maximus, for Valentinian found no person so proper to negotiate with him. He spoke to him with great courage and boldness, but could obtain nothing; for Maximus soon after marched into Italy, and made himself master of the western empire: so that Valentinian was obliged to retire, with his mother Justina and his sister Galla, to Thessalonica in Illyricum, in order to desire Theodosius's assistance; who defeated Maximus, and restored Valentinian to the empire.

While Theodosius continued in Italy, after the defeat of Maximus, an insurrection happened at Thessalonica, in which several of the magistrates were stoned, and their bodies dragged along the streets. Theodosius being informed of this, rashly commanded a certain number of the inhabitants to be put to death promiscuously;

Ambrose.

Ambrose. cuously; by which means the city was filled with the blood of many innocent persons, and amongst the rest several strangers who were but just come there: no regard was had to any distinction of persons, no form of trial was observed; but they were cut down like corn in the harvest, as Theodoret expresses it, to the number of 7000. At this time an assembly of bishops was held at Milan, who all expressed an abhorrence of such cruelty in the emperor. Ambrose wrote a letter to him, in which he represented the enormity of his crime, and exhorted him to make satisfaction by a sincere submission and repentance. Some time after, Theodosius coming to Milan, went to receive the sacrament at the great church; where Ambrose meeting him at the door, denied him entrance, and represented his guilt in the most forcible and pathetic terms. The emperor was struck with his words, and with great uneasiness of mind returned to his palace; but about a year after, Ambrose, being convinced of the sincerity of his repentance, admitted him into the church.

In 392, Valentinian the emperor being assassinated by the contrivance of Arbogastes, and Eugenius usurping the empire, Ambrose was obliged to leave Milan; but he returned the year following, when Eugenius was defeated. He died at Milan the 4th of April 397; being 57 years of age, according to Mr Du Pin and some other writers; but Dr Cave and Olearius say that he was 64 years old at his death. He was buried in the great church at Milan. He wrote several works, the most considerable of which is that *De officiis*. He is concise and sententious in his manner of writing, and full of turns of wit; his terms are well chosen, and his expressions noble; he diversifies his subject by an admirable copiousness of thought and language; he is very ingenious in giving an easy and natural turn to every thing which he treats of, and is not without strength and pathos when there is occasion for it. This is part of the character which Du Pin gives him as a writer; but Erasmus observes that he has many quaint and affected sentences, and frequently very obscure ones; and it is certain that his writings are intermixed with many strange and peculiar opinions. Paulinus wrote his life, and dedicated it to St Augustine: this life is prefixed to St Ambrose's works; the best edition of which is reckoned to be that published by the Benedictine monks, in two volumes in folio, at Paris, in 1686 and 1690.

AMBROSE (Isaac), an eminent presbyterian minister, was educated at Brazen-nose college Oxford, where he took the degree of bachelor of arts, and became minister of Preston, and afterwards of Garstang in Lancashire, where he was in 1662 ejected for non-conformity. It was usual with him to retire every year for a month into a little hut in a wood; where he shunned all society, and devoted himself to religious contemplation. Dr Calamy observes, that he had a very strong impulse on his mind of the approach of death, and took a formal leave of his friends at their house a little before his departure; and the last night of his life he sent his discourse concerning *angels* to the press. The next day he shut himself up in his parlour, where, to the great surprise and regret of all who saw him, he was found just expiring. He died in 1663-4, in the 72^d year of his age. He wrote several other books; as the *Prima, Media, et Ul-*

tima, or the First, Middle, and last Things; War with Ambrosia devils; Looking unto Jesus, &c.

AMBROSE, or St AMBROSE in the Wood, an order of religious, who use the Ambrosian office, and wear an image of that saint engraven on a little plate: in other respects, they conform to the rule of the Augustins. See AMBROSIAN Office, and AUGUSTINS.

AMBROSIA, in heathen antiquity, denotes the solid food of the gods, in contradistinction from the drink, which was called *nectar*. It had the appellation *ambrosia* (compounded of the particle *a*, and *βροτος*, immortal,) as being supposed to render those immortal who fed on it.

AMBROSIA is also a splendid kind of title, given by some physicians to certain alexipharmic compositions, of extraordinary virtue. The name was particularly given to a famous antidote of Philip of Macedon, against all poisons, bites, and stings of venomous creatures, as well as many internal diseases.

AMBROSIA: A genus of the pentandria order, belonging to the monœcia class of plants; and, in the natural method, ranking under the 49th order, *Compositæ-nucamentaceæ*. The characters are:—The MALE flowers are compound: The common *calyx* is a single-leav'd perianthium, the length of the florets. The compound *corolla* is uniform, tubular, flat, and hemispherical; the proper is monopetalous, funnel-shaped, and quinquefid: The *stamina* consist of five very small filaments; the antheræ are erect, parallel, and pointed; The *pisillum* has a filiform stylus, the length of the *stamina*; the stigma orbicular and membranous: The *receptaculum* is naked.—FEMALE flowers below the male ones, on the same plant, doubled: The *calyx* is a single-leav'd perianthium, entire (with the belly quinqueidentated), one-flowered, and persistent: There is no *corolla*: The *pisillum* has an ovate germen in the bottom of the calyx; a filiform stylus, the length of the calyx; and two long bristly stigmata: The *pericarpium* is an ovate unilocular nut: The *seed* is single and roundish. Of this genus five species are enumerated; but having no properties worthy of notice, we omit any farther account of them.

AMBROSIAN OFFICE, or RITE, in church-history, a particular formula of worship in the church of Milan, which takes its name from St Ambrose, who instituted that office in the fourth century. Each church originally had its particular office; and when the Pope, in after-times, took upon him to impose the Roman office upon all the western churches, that of Milan sheltered itself under the name and authority of St Ambrose; from which time the Ambrosian ritual has prevailed.

AMBROSIN, in middle-age writers, denotes a coin struck by the lords or dukes of Milan, whereon was represented St Ambrose on horseback, with a whip in his right hand. The occasion of this coinage is said to have been a vision of that saint, who appeared to the Milanese general in 1339, during the time of a battle.

AMBROSINIA, in botany; a genus of the polyandria order belonging to the gynandria class of plants; the characters of which are: The *calyx* is a single-leaved spatha, divided by a partition into two cells: There is no *corolla*: The *stamina* consist of a single filament in the interior cell; the antheræ are numerous,

Ambrosius. numerous, with two roundish concave nectaries at their base: The *pistillum* is in the interior cell; the germen roundish; the stylus cylindrical, and shorter than the spatha; the stigma obtuse: The *pericarpium* (a capsule?) roundish and unilocular. There is but one species, a native of Turkey.

AMBROSIUS AURELIANUS, or AURELIUS AMBROSIUS, a famous general of the ancient Britons, of Roman extraction. He was educated at the court of Aldroen of Amoria; who, at the request of the Britons, sent him over with ten thousand men, to assist them against the Saxons, whom Vortigern had invited into Britain. Ambrosius had such success against the Saxons, that the Britons chose him for their king, and compelled Vortigern to give up to him all the western part of the kingdom divided by the Roman highway called *Watling-street*. Some time after, the Britons being discontented with Vortigern, and having withdrawn their allegiance from him, he returned to a castle in Wales, where being besieged by Ambrosius, and the castle taking fire, he perished in the flames, and left his rival sole monarch of Britain; who now took upon him the imperial purple, after the manner of the Roman emperors. Geoffrey of Monmouth tells us, that Ambrosius built Stonehenge near Salisbury in Wiltshire. Ambrosius, according to this historian, coming to a monastery near Caer-caradoc, now Salisbury, where three hundred British lords, massacred by Hengist, lay buried, and resolving to perpetuate the memory of this action, he ordered his workmen to prepare a large quantity of stones and other materials. But having, at the instigation of Tremounus archbishop of Caerleon, consulted the famous Merlin, this magician advised him to send over to Ireland for certain great stones, called *chorea gigantum*, the giant's dance, placed in a circle on a hill called *Killair*, having been brought thither by giants from the farthest borders of Africa. A body of forces were accordingly sent into Ireland, under Pendragon, Ambrosius's brother, to fetch these stones; but were opposed in their attempt by Giliomanus king of the country, who derided the folly of the Britons in undertaking so ridiculous an expedition. Nevertheless, the Britons having vanquished this prince in battle, brought away the stones; and by the direction and assistance of Merlin, who had accompanied them, these wonderful stones, by order of Ambrosius, were placed over the graves of the British lords, and are now what is called *Stonehenge*. Alexander Meham celebrates this fable in his poem *De divina sapientiae laudibus*. Polydore Virgil assigns another origin of Stonehenge: he tells us it was erected by the Britons as a monument to their general Ambrosius, on the place where he fell in battle, to perpetuate the memory of his glorious actions and services done to his country. Both these stories are rejected by our best antiquaries; who, however, are by no means agreed as to the true origin of this famous piece of antiquity. See *STONEHENGE*.

After the Britons had defeated the Saxons, and obliged them to retire northward, Ambrosius is said to have convened the princes and great men at York, where he gave orders for repairing the churches destroyed by the Saxons, and restoring the exercise of religion to its former lustre. This is confirmed by Matthew of Westminster; who highly applauds the great zeal of

Ambrosius in repairing the churches, encouraging the clergy, and restoring the honour of religion. The Monmouth historian gives this prince a very high character. "He was a man (says he) of such bravery and courage, that when he was in Gaul no one durst enter the lists with him; for he was sure to unhorse his antagonist, or to break his spear into shivers. He was, moreover, generous in bestowing, careful in performing religious duties, moderate in all things, and more especially abhorred a lie. He was strong on foot, stronger on horseback, and perfectly qualified to command an army." The same author tells us he was poisoned at Winchester by one Eopa a Saxon, disguised as a physician, and hired for that purpose by Pascentius one of the sons of Vortigern: but the generally received opinion is, that he was killed in a battle which he lost in the year 508, against Cerdric, one of the Saxon generals.

AMBRY, a place in which are deposited all utensils necessary for house-keeping. In the ancient abbeys and priories, there was an office under this denomination, wherein were laid up all charities for the poor.

AMBUBAJÆ, in Roman antiquity, were immodest women, who came from Syria to Rome, where they lived by prostitution, and by playing on the flute: the word is derived from the Syriac *abub*, which signifies a flute; altho' others make it to come from *am* and *Baia*, because these prostitutes often retired to Baia. According to Cruquius, these women used likewise to sell paint for ornamenting the face, &c.

AMBULANT, or AMBULATORY. They give in France the name of *ambulant commissioners* to those commissioners, or clerks of the king's farms, who have no settled office; but visit all the offices within a certain district, to see that nothing be done in them against the king's right and the interest of the farm.

AMBULANT is also used to denote those brokers at Amsterdam, or exchange agents, who have not been sworn before the magistrates. They transact brokerage business, but their testimony is not received in the courts of justice.

AMBULATORY, a term anciently applied to such courts, &c. as were not fixed to any certain place; but held sometimes in one place, and sometimes in another. In opposition to stationary courts.—The court of parliament was anciently ambulatory; so also were the courts of king's bench, &c.

AMBURBIUM, in Roman antiquity, a procession made by the Romans round the city and pomerium, in which they led a victim, and afterwards sacrificed it, in order to avert some calamity that threatened the city.

AMBURY, or ANBURY, among ferriers, denotes a tumor, wart, or swelling, which is soft to the touch, and full of blood.

This disorder of horses is cured by tying a horse-hair very hard about its root; and, when it has fallen off, which commonly happens in about eight days, strewing some powder of verdigris upon the part, to prevent the return of the complaint. If the tumor be so low that nothing can be tied about it, they cut it out with a knife, or else burn it off with a sharp hot iron; and, in sinewy parts, where a hot iron is improper, they eat it away with oil of vitriol, or white sublimate.

Many

Ambry
||
Ambury.

Ambuscade
||
Amédians.

Many of our farriers boast of a secret which infallibly cures all kinds of protuberances of this kind; the preparation of which is this: Take three ounces of green vitriol and one ounce of white arsenic; beat them to a coarse powder, and put them into a crucible; place the crucible in the midst of a charcoal fire, stirring the substance, but carefully avoiding the poisonous steams; when the whole grows reddish, take the crucible out of the fire, and, when cool, break it and take out the matter at the bottom; beat this to powder in a mortar, and add to four ounces of this powder five ounces of *album rhoss*; make the whole into an ointment, and let it be applied cold to warts; rubbing them with it every day. They will by this means fall off gently and easily, without leaving any swellings. It is best to keep the horse quiet, and without working, during the cure. What sores remain on the parts which the swellings fall off from, may be cured with the common application called the *countess's ointment*.

AMBUSCADE, or AMBUSH, in the military art, properly denotes a place where soldiers may lie concealed till they find an opportunity to surprise the enemy.

In the language of Scripture, these terms are not always taken in their proper signification, for laying ambushes for any one, attacking him in secret, laying snares for him. They sometimes signify no more than attacking a man who has no distrust of such a thing; attacking one behind, concealing one's self in some particular place in order to surprise any one. See the book of Judges, ch. ix. 25. 32. 34. 35. Abimelech, who lay lurking with his people in the heights of Sichem, so, however, as to rob and treat those who passed that way very ill, came and attacked the city of Sichem with his troops divided into three bodies: *Tetendit insidias juxta Sichimam in quatuor locis*. Literally, according to the Hebrew, "They prepared ambuscades against Sichem in four heads or companies." And a little farther, verse 43. "Abimelech, being informed that the Sichemites were marched, took his army and divided it into three bodies, and laid wait for them in the field." It seems certain, that in these passages ambushes, properly so called, were not the things in question. In the first book of Samuel, Saul complains that David laid ambuscades for him: *Insidiator usque hodie permanens*. Now nothing could be worse grounded than this accusation, if we understand the word *insidiari* in its proper signification; but he might say, though unjustly, that David was his secret enemy. And in the Chronicles it is said, that God turned the ambushes laid by the enemies of Israel upon themselves; that is to say, their endeavours, their malice, their arms, he turned against themselves: for the enemies there mentioned came not in private or by stratagem; they marched openly in arms against Israel.

AMBY, a town of the Austrian Netherlands, in the province of Limburg, situated opposite to Maestricht, on the east side of the river Maele, in E. Long. 5. 45. N. Lat. 50. 57.

AMEDIANS, in church history, a congregation of religious in Italy, so called from their professing themselves *amantes Deum*, "lovers of God;" or rather *amati Deo*, "beloved of God." They wore a grey habit and wooden shoes, had no breeches, and girt

Nº 14.

themselves with a cord. They had 28 convents; and were united by Pope Pius V. partly with the Cistercian order, and partly with that of the Soccolanti, or wooden-shoe wearers.

AMELIA, an episcopal city of Italy, in the state of the church, seated on a mountain, in the duchy of Spoleto. E. Long. 13. 20. N. Lat. 42. 33.

AMELLUS, STARWORT: A genus of the polygamia superflua order, belonging to the syngenesia class of plants; and in the natural method ranking under the 49th order, *Compositæ oppositifoliæ*. The characters are: The common calyx is imbricated and roundish: The compound corolla is radiated; the hermaphrodite corollas numerous in the disk; the female numerous in the ray: Proper corolla of the hermaphrodites are tubular and quinquefid; of the females, tongued, loose, and two or three toothed: The stamina in the hermaphrodites consist of five short capillary filaments; the anthera cylindric and tubular: The pistillum has an ovate germen; a filiform stylus the length of the stamina; and two filiform stigmata: There is no pericarpium, but the calyx unchanged: The seeds are ovate and solitary; the pappus is hairy; the receptaculum chaffy.—Of this there are two

Species. 1. The lynchitis, with one flower on each footstalk. This is a native of the Cape of Good Hope. It is a perennial plant, rising about three feet high, sending out many branches on each side, so as to form a bushy plant; the branches are garnished with obtuse spear-shaped leaves placed opposite, and are terminated by single naked flower stalks, each supporting one violet-coloured flower, having a yellow disk, which is succeeded by oblong seeds. 2. The umbellatus, with flowers growing in umbels, is a native of Jamaica; and rises from two to three feet high, sending out many branches clothed with opposite leaves, which are terminated by small flowers in umbels.

Culture. The first is easily propagated, either by cuttings planted in the summer-months, or by seeds sown on a moderate hot-bed in the spring, but the plants require a slight shelter in winter. The second is much more tender, and therefore requires to be preserved in a stove during the winter season.

AMELOT DE LA HOUSSAI (Nicholas), born at Orleans in 1634, was much esteemed at the Court of France, and appointed secretary of an embassy which that court sent to the commonwealth of Venice, as appears by the title of his translation of Father Paul's History of the Council of Trent; but he afterwards published writings which gave such offence, that he was imprisoned in the Bastille. The first works he printed were the History of the Government of Venice, and that of the Uscocks, a people of Croatia. In 1683 he published his translations into French of Machiavel's Prince, and Father Paul's History of the Council of Trent, and Political Discourses of his own upon Tacitus. These performances were well received by the public. He did not prefix his own name to the two last-mentioned works, but concealed himself under that of La Mothe Joffeval. His translation of Father Paul was attacked by the partisans of the pope's unbounded power and authority. In France, however, it met with great success; all the advocates for the liberty of the Gallican church promoting the success of it to the utmost of their power, though at the same time there were three memorials presented

Amelot, Amen. presented to have it suppressed. When the second edition of this translation was published, it was violently attacked by the Abbé St Real, in a letter he wrote to Mr Bayle, dated October 17. 1685. Amelot defended himself, in a letter to the same gentleman. In 1684, he printed, at Paris, a French translation of Baltasar Gracian's *Oraculo manual*, with the title of *l'Homme de Cour*. In 1686, he printed *La Morale de Tacite de la flaterie*; in which work he collected several particular facts and maxims, which represent in a strong light the artifices of court-flatterers, and the mischievous effect of their poisonous discourses. Frederick Leonard, a bookseller at Paris, having proposed, in the year 1692, to print a collection of all the treaties of peace between the kings of France and all the other princes of Europe, since the reign of Charles VII. to the year 1690, Amelot published a small volume in duodecimo, containing a preliminary discourse upon these treaties; wherein he endeavours to show, that most princes, when they enter into a treaty, think more how to evade than how to perform the terms they subscribe to. He published also an edition of Cardinal d'Ossat's Letters in 1697, with several observations of his own; which, as he tells us in his advertisement, may serve as a supplement to the history of the reigns of Henry III. and Henry IV. kings of France. He wrote several other works; and died at Paris in 1706, being then almost 73 years of age.

AMELOT, (Denis), a celebrated French writer, was born at Saintonge in 1606. He maintained a close correspondence with the fathers of the Oratory, a congregation of priests founded by Philip of Neri. He wrote the life of Charles de Gondren, second superior of this congregation, and published it at Paris in 1643. In this piece he said something of the famous Abbot of St Cyran, which greatly displeased the gentlemen of Port Royal; who, to be revenged of him, published a libel against him, intitled *Idee generale de l'esprit et de l'ivre de P. Amelote*. He was so much provoked by this satire, that he did all in his power to injure them. They had finished a translation of the New Testament, and were desirous to have it published; for which purpose they endeavoured to procure an approbation from the doctors of the Sorbonne, and a privilege from the king. But Amelot, by his influence with the Chancellor, prevented them from succeeding. In this he had also a view to his own interest; for he was about to publish a translation of his own of the New Testament. Amelot's translation with annotations, in 4 vols octavo, was printed in the years 1666, 1667, and 1668. It is not very exact, according to F. Simon, who tells us that it contains some very gross blunders. Amelot wrote also an Abridgement of Divinity, a Catechism for the Jubilee, and a kind of Christian Manual for every day. Towards the end of his life, he entered into the congregation of the Oratory in 1650; and continued amongst them till his death, which happened in 1678.

AMEN, *amen*, signifies true, faithful, certain. It is made use of likewise to affirm any thing, and was a sort of affirmation used often by our Saviour: *amen, amen, λέγω υμιν*, i. e. *Verily, verily, I say unto you*. Lastly, it is understood as expressing a wish; as, *Amen, So be it*, Numb. v. 22. or an affirmation, *Amen, yes, I be-*

VOL. I. Part II.

lieve it, 1 Cor. xiv. 16. The Hebrews, and the five books of Psalms, according to their way of distributing them, with the words *Amen, amen*; which the Septuagint have translated, *γενοιο, γενοιο*; and the Latins, *Fiat, fiat*. The Greek and Latin churches have preserved this word in their prayers, as well as *alleluia* and *hosannah*; because they observed more energy in them than in any terms which they could use in their own languages. At the conclusion of the public prayers, the people answered with a loud voice, *Amen*; and St Jerom says, that at Rome, when the people answered *Amen*, the sound of their voices was like a clap of thunder: *In similitudinem celestis tonitru* *Amen reboat*. The Jews assert, that the gates of heaven are opened to him who answers *Amen* with all his might.

AMEND, or **AMENDE**, in the French customs, a pecuniary punishment imposed by a judge for any crime, false prosecution, or groundless appeal.

AMENDE Honourable, an infamous kind of punishment inflicted in France upon traitors, parricides, or sacrilegious persons, in the following manner: The offender being delivered into the hands of the hangman, his shirt is stripped off, a rope put about his neck, and a taper in his hand; then he is led into court, where he must beg pardon of God, the king, the court, and his country. Sometimes the punishment ends here; but sometimes it is only a prelude to death, or banishment to the galleys.

AMENDE Honourable, is a term also used for making recantation in open court, or in presence of the person injured.

AMENDMENT, in a general sense, denotes some alteration or change made in a thing for the better.

AMENDMENT, in law, the correction of an error committed in a process, which may be amended after judgement, unless the error lies in giving judgement; for in that case it is not amendable, but the party must bring a writ of error. A bill may be amended on the file at any time before the plea is pleaded; but not afterwards, without motion and leave of the court.

AMENDMENT of a Bill, in parliament, is some alteration made in the first draught of it.

AMENTUM, in botany, the name of a species of calyx, consisting of valves, and hanging down in different directions from the caulis. Common oats afford a good example of the amentum.

AMENTUM, in Roman antiquity, a thong tied about the middle of a javelin or dart, and fastened to the forefinger, in order to recover the weapon as soon as it was discharged. The ancients made great use of the amentum, thinking it helped to enforce the blow. It also denotes a latchet that bound their sandals.

AMERADE, a kind of officers among the Saracens, answering to the governors of provinces among the Europeans.—The name is originally the same with that of emir.

AMERCEMENT, or **AMERCIAMENT**, in law, a pecuniary punishment imposed on offenders at the mercy of the court. It differs from a fine in being imposed arbitrarily, in proportion to the fault; whereas a fine is a certain punishment settled expressly by some statute.

AMERICA, (from *Americus Vesputius*, falsely said to be the first discoverer of the continent); one of the

Amend

||
America.

America. four quarters of the world, probably the largest of the whole, and from its late discovery frequently denominated the *New World*.

Boundaries. This vast country extends from the 80th degree of north, to the 56th degree of south latitude; and, where its breadth is known, from the 35th to the 136th degree west longitude from London; stretching between 8000 and 9000 miles in length, and in its greatest breadth 3690. It sees both hemispheres, has two summers and a double winter, and enjoys all the variety of climates which the earth affords. It is washed by the two great oceans. To the eastward it has the Atlantic, which divides it from Europe and Africa; to the west it has the Pacific or Great South Sea, by which it is separated from Asia. By these seas it may, and does, carry on a direct commerce with the other three parts of the world.

North and South continent. America is not of equal breadth throughout its whole extent; but is divided into two great continents, called *North* and *South America*, by an isthmus 1500 miles long, and which at Darien, about Lat. 9° N. is only 60 miles over. This isthmus forms, with the northern and southern continents, a vast gulph, in which lie a great number of islands, called the *West Indies*, in contradistinction to the eastern parts of Asia, which are called the *East Indies*.

Remarkable prevalence of cold. Between the New World and the Old, there are several very striking differences; but the most remarkable is the general predominance of cold throughout the whole extent of America. Though we cannot, in any country, determine the precise degree of heat merely by the distance of the equator, because the elevation above the sea, the nature of the soil, &c. affect the climate; yet, in the ancient continent, the heat is much more in proportion to the vicinity to the equator than in any part of America. Here the rigour of the frigid zone extends over half that which should be temperate by its position. Even in those latitudes where the winter is scarcely felt on the Old continent, it reigns with great severity in America, though during a short period. Nor does this cold, prevalent in the New World, confine itself to the temperate zones; but extends its influence to the torrid zone also, considerably mitigating the excess of its heat.—Along the eastern coast, the climate, though more similar to that of the torrid zone in other parts of the earth, is nevertheless considerably milder than in those countries of Asia and Africa which lie in the same latitude. From the southern tropic to the extremity of the American continent, the cold is said to be much greater than in parallel northern latitudes even of America itself.

For this so remarkable difference between the climate of the New continent and the Old, various causes have been assigned by different authors. The following is Dr Robert-son's opinion of the learned Dr Robert-son on this subject. "Though the utmost extent of America towards the north be not yet discovered, we know that it advances nearer to the pole than either Europe or Asia. The latter have large seas to the north, which are open during part of the year; and, even when covered with ice, the wind that blows over them is less intensely cold than that which blows over land in the same latitudes. But, in America, the land stretches from the river St Laurence towards the pole, and spreads out immensely to the west. A chain of enormous moun-

tains, covered with snow and ice, runs through all this dreary region. The wind passing over such an extent of high and frozen land, becomes so impregnated with cold, that it acquires a piercing keenness, which it retains in its progress through warmer climates; and is not entirely mitigated until it reach the gulph of Mexico. Over all the continent of North America, a north-westerly wind and excessive cold are synonymous terms. Even in the most sultry weather, the moment that the wind veers to that quarter, its penetrating influence is felt in a transition from heat to cold no less violent than sudden. To this powerful cause we may ascribe the extraordinary dominion of cold, and its violent inroads into the southern provinces in that part of the globe.

"Other causes, no less remarkable, diminish the active power of heat in those parts of the American continent which lie between the tropics. In all that portion of the globe, the wind blows in an invariable direction from east to west. As this wind holds its course across the ancient continent, it arrives at the countries which stretch along the western shore of Africa, inflamed with all the fiery particles which it hath collected from the sultry plains of Asia, and the burning sands in the African deserts. The coast of Africa is accordingly the region of the earth which feels the most fervent heat, and is exposed to the unmitigated ardour of the torrid zone. But this same wind, which brings such an accession of warmth to the countries lying between the river of Senegal and Cafraria, traverses the Atlantic ocean before it reaches the American shore. It is cooled in its passage over this vast body of water; and is felt as a refreshing gale along the coasts of Brasil and Guiana, rendering those countries, tho' amongst the warmest in America, temperate, when compared with those which lie opposite to them in Africa. As this wind advances in its course across America, it meets with immense plains covered with impenetrable forests; or occupied by large rivers, marshes, and stagnating waters, where it can recover no considerable degree of heat. At length it arrives at the Andes, which run from north to south through the whole continent. In passing over their elevated and frozen summits, it is so thoroughly cooled, that the greater part of the countries beyond them hardly feel the ardour to which they seem exposed by their situation. In the other provinces of America, from Terra Firma westward to the Mexican empire, the heat of the climate is tempered, in some places, by the elevation of the land above the sea; in others, by their extraordinary humidity; and in all, by the enormous mountains scattered over this tract. The islands of America in the torrid zone are either small or mountainous, and are fanned alternately by refreshing sea and land breezes.

"The causes of the extraordinary cold towards the southern limits of America, and in the seas beyond it, cannot be ascertained in a manner equally satisfying. It was long supposed, that a vast continent, distinguished by the name of *Terra Australis Incognita*, lay between the southern extremity of America and the antarctic pole. The same principles which account for the extraordinary degree of cold in the northern regions of America, were employed in order to explain that which is felt at Cape Horn and the adjacent countries. The immense extent of the southern continent, and the rivers



Plate XII.

Longitude from London

A. Bell & Son



Plat. XII.

Ameri
W

212. P
note 11

America. rivers which it poured into the ocean, were mentioned and admitted by philosophers as causes sufficient to occasion the unusual sensation of cold, and the still more uncommon appearances of frozen seas in that region of the globe. But the imaginary continent to which such influence was ascribed having been searched for in vain, and the space which it was supposed to occupy having been found to be an open sea, new conjectures must be formed with respect to the causes of a temperature of climate, so extremely different from that which we experience in countries removed at the same distance from the opposite pole.

Ibid. p. 451.
note xxxi.

"The most obvious and probable cause of this superior degree of cold towards the southern extremity of America, seems to be the form of the continent there. Its breadth gradually decreases as it stretches from St Antonio southwards, and from the bay of St Julian to the straits of Magellan its dimensions are much contracted. On the east and west sides, it is washed by the Atlantic and Pacific oceans. From its southern point, it is probable that an open sea stretches to the antarctic pole. In whichever of these directions the wind blows, it is cooled before it approaches the Magellanic regions, by passing over a vast body of water; nor is the land there of such extent, that it can recover any considerable degree of heat in its progress over it. These circumstances concur in rendering the temperature of the air in this district of America more similar to that of an insular, than to that of a continental climate; and hinder it from acquiring the same degree of summer-heat with places in Europe and Asia, in a corresponding northern latitude. The north wind is the only one that reaches this part of America, after blowing over a great continent. But, from an attentive survey of its position, this will be found to have a tendency rather to diminish than augment the degree of heat. The southern extremity of America is properly the termination of the immense ridge of the Andes, which stretches nearly in a direct line from north to south, through the whole extent of the continent. The most sultry regions in South America, Guiana, Brasil, Paraguay, and Tucuman, lie many degrees to the east of the Magellanic regions. The level country of Peru, which enjoys the tropical heats, is situated considerably to the west of them. The north wind, then, though it blows over land, does not bring to the southern extremity of America an increase of heat collected in its passage over torrid regions; but, before it arrives there, it must have swept along the summit of the Andes, and come impregnated with the cold of that frozen region."

5
Extreme
moisture of
the Ameri-
can climate.

Another particularity in the climate of America, is its excessive moisture in general. In some places, indeed, on the western coast, rain is not known; but, in all other parts, the moistness of the climate is as remarkable as the cold.—The forests wherewith it is every where covered, no doubt, partly occasion the moisture of its climate; but the most prevalent cause is the vast quantity of water in the Atlantic and Pacific oceans, with which America is environed on all sides. Hence those places where the continent is narrowest are deluged with almost perpetual rains, accompanied with violent thunder and lightning, by which some of them, particularly Porto Bello, are rendered in a manner uninhabitable.

This extreme moisture of the American climate is America. productive of much larger rivers there than in any other part of the world. The Danube, the Nile, the Indus, or the Ganges, are not comparable to the Mississippi, the river St Laurence, or that of the Amazons; nor are such large lakes to be found any where as those which North America affords.—To the same cause we are also partly to ascribe the excessive luxuriance of all

6
Large ri-
vers, and
excessive
luxuriance
of vegeta-

kinds of vegetables in almost all parts of this country. In the southern provinces, where the moisture of the climate is aided by the warmth of the sun, the woods are almost impervious, and the surface of the ground is hid from the eye, under a thick covering of shrubs, herbs, and weeds.—In the northern provinces, the forests are not encumbered with the same luxuriance of vegetation; nevertheless, they afford trees much larger of their kind than what are to be found any where else.

From the coldness and the moisture of America, an extreme malignity of climate has been inferred, and as- ferted by M. de Paw, in his *Recherches Philosophiques*. Hence, according to his hypothesis, the smallness and irregularity of the nobler animals, and the size and enormous multiplication of reptiles and insects.

7
Malignity
of climate
unjustly a-
scribed to
America.

But the supposed smallness and less ferocity of the American animals, the Abbé Clavigero observes, instead of the malignity, demonstrates the mildness and bounty of the clime, if we give credit to Buffon, at whose fountain M. de Paw has drank, and of whose testimony he has availed himself against Don Pernetty. Buffon, who in many places of his *Natural History* produces the smallness of the American animals as a certain argument of the malignity of the climate of America, in treating afterwards of savage animals, in Tom. II. speaks thus: "As all things, even the most free creatures, are subject to natural laws, and animals as well as men are subjected to the influence of climate and soil, it appears that the same causes which have civilized and polished the human species in our climates, may have likewise produced similar effects upon other species. The wolf, which is perhaps the fiercest of all the quadrupeds of the temperate zone, is however incomparably less terrible than the tyger, the lion, and the panther of the torrid zone; and the white bear and hyena of the frigid zone. In America, where the air and the earth are more mild than those of Africa, the tyger, the lion, and the panther, are not terrible but in the name. They have degenerated, if fierceness, joined to cruelty, made their nature; or, to speak more properly, they have only suffered the influence of the climate: under a milder sky, their nature also has become more mild. From climes which are immoderate in their temperature, are obtained drugs, perfumes, poisons, and all those plants whose qualities are strong. The temperate earth, on the contrary, produces only things which are temperate; the mildest herbs, the most wholesome pulse, the sweetest fruits, the most quiet animals, and the most humane men, are the natives of this happy clime. As the earth makes the plants, the earth and plants make animals; the earth, the plants, and the animals make man. The physical qualities of man, and the animals which feed on other animals, depend, though more remotely, on the same causes which influence their dispositions and customs. This is the greatest proof and demonstration, that in temperate climes every thing becomes temperate, and that in in-

*History of
Mexico,*
vol. II.
p. 255.

America. temperate climes every thing is excessive; and that size and form, which appear fixed and determinate qualities, depend notwithstanding, like the relative qualities, on the influence of climate. The size of our quadrupeds cannot be compared with that of an elephant, the rhinoceros, or sea-horse. The largest of our birds are but small, if compared with the ostrich, the condore, and *casoars*." So far M. Buffon, whose text we have copied, because it is contrary to what M. de Paw writes against the climate of America, and to Buffon himself in many other places.

If the large and fierce animals are natives of intemperate climes, and small and tranquil animals of temperate climes, as M. Buffon has here established; if mildness of climate influences the disposition and customs of animals, M. de Paw does not well deduce the malignity of the climate of America from the smaller size and less fierceness of its animals; he ought rather to have deduced the gentleness and sweetness of its climate from this antecedent. If, on the contrary, the smaller size and less fierceness of the American animals, with respect to those of the old continent, are a proof of their degeneracy, arising from the malignity of the climate, as M. de Paw would have it, we ought in like manner to argue the malignity of the climate of Europe from the smaller size and less fierceness of its animals, compared with those of Africa. If a philosopher of the country of Guinea should undertake a work in imitation of M. de Paw, with this title, *Recherches Philosophiques sur les Europeens*, he might avail himself of the same argument which M. de Paw uses, to demonstrate the malignity of the climate of Europe, and the advantages of that of Africa. The climate of Europe, he would say, is very unfavourable to the production of quadrupeds, which are found incomparably smaller, and more cowardly than ours. What are the horse and the ox, the largest of its animals, compared with our elephants, our rhinoceroses, our sea-horses, and our camels? What are its lizards, either in size or intrepidity, compared with our crocodiles? Its wolves, its bears, the most dreadful of its wild beasts, when beside our lions and tygers? Its eagles, its vultures, and cranes, if compared with our ostriches, appear only like hens.

8
America
not more
infested
than other
countries
with insects
and noxious
animals.

As to the enormous size and prodigious multiplication of the insects and other little noxious animals, "The surface of the earth, (says M. de Paw), infested by putrefaction, was over-run with lizards, serpents, reptiles, and insects monstrous for size, and the activity of their poison, which they drew from the copious juices of this uncultivated soil, that was corrupted and abandoned to itself, where the nutritive juice became sharp, like the milk in the breast of animals which do not exercise the virtue of propagation. Caterpillars, crabs, butterflies, beetles, spiders, frogs, and toads, were for the most part of an enormous corpulence in their species, and multiplied beyond what can be imagined. Panama is infested with serpents, Carthage with clouds of enormous bats, Portobello with toads, Surinam with *kakerlacas*, or *cucarachas*, Guadaloupe, and the other colonies of the islands, with beetles, Quito with niguas or chegoes, and Lima with lice and bugs. The ancient kings of Mexico, and the emperors of Peru, found no other means of ridding their subjects of those insects which fed upon them, than the imposition of an annual tribute of a certain quantity of lice.

Ferdinand Cortes found bags full of them in the palace of Montezuma." But this argument, exaggerated as it is, proves nothing against the climate of America in general, much less against that of Mexico. There being some lands in America, in which, on account of their heat, humidity, or want of inhabitants, large insects are found, and excessively multiplied, will prove at most, that in some places the surface of the earth is infested, as he says, with putrefaction; but not that the soil of Mexico, or that of all America, is stinking, uncultivated, vitiated, and abandoned to itself. If such a deduction were just, M. de Paw might also say, that the soil of the old continent is barren, and stinks; as in many countries of it there are prodigious multitudes of monstrous insects, noxious reptiles, and vile animals, as in the Philippine isles, in many of those of the Indian archipelago, in several countries of the south of Asia, in many of Africa, and even in some of Europe. The Philippine isles are infested with enormous ants and monstrous butterflies, Japan with scorpions, South of Asia and Africa with serpents, Egypt with asps, Guinea and Ethiopia with armies of ants, Holland with field-rats, Ukrania with toads, as M. de Paw himself affirms. In Italy, the Campagna di Roma, (although peopled for so many ages), with vipers; Calabria with tarantulas; the shores of the Adriatic sea, with clouds of gnats; and even in France, the population of which is so great and so ancient, whose lands are so well cultivated, and whose climate is so celebrated by the French, there appeared, a few years ago, according to M. Buffon, a new species of field-mice, larger than the common kind, called by him *Surmulots*, which have multiplied exceedingly, to the great damage of the fields. M. Bazin, in his Compendium of the History of Insects, numbers 77 species of bugs, which are all found in Paris and its neighbourhood. That large capital, as Mr Bomare says, swarms with those disgusting insects. It is true, that there are places in America, where the multitude of insects, and filthy vermin, make life irksome; but we do not know that they have arrived to such excess of multiplication as to depopulate any place, at least there cannot be so many examples produced of this cause of depopulation in the new as in the old continent, which are attested by Theophrastus, Varro, Pliny, and other authors. The frogs depopulated one place in Gaul, and the locusts another in Africa. One of the Cyclades was depopulated by mice; Amiclas, near to Taracina, by serpents; another place, near to Ethiopia, by scorpions and poisonous ants; and another by scolopendras; and not so distant from our own times, the Mauritius was going to have been abandoned on account of the extraordinary multiplication of rats, as we can remember to have read in a French author.

With respect to the size of the insects, reptiles, and such animals, M. de Paw makes use of the testimony of Mr Dumont, who, in his Memoirs on Louisiana, says, that the frogs are so large there that they weigh 37 French pounds, and their horrid croaking imitates the bellowing of cows. But M. de Paw himself says, (in his answer to Don Pernetty, cap. 17.), that all those who have written about Louisiana from Henepin, Le Clerc, and Cav. Tonti, to Dumont, have contradicted each other, sometimes on one and sometimes on another

America. ther subject. In fact, neither in the old or the new continent are there frogs of 37 pounds in weight; but there are in Asia and Africa serpents, butterflies, ants, and other animals of such monstrous size, that they exceed all those which have been discovered in the new world. We know very well, that some American historian says, that a certain gigantic species of serpents is to be found in the woods, which attract men with their breath, and swallow them up; but we know also, that several historians, both ancient and modern, report the same thing of the serpents of Asia, and even something more. Megasthenes, cited by Pliny, said, that there were serpents found in Asia, so large, than they swallowed entire stags and bulls. Metrodorus, cited by the same author, affirms, that in Asia there were serpents which, by their breath, attracted birds, however high they were, or quick their flight. Among the moderns, Gemelli, in Vol. V. of his Tour of the World, when he treats of the animals of the Philippine isles, speaks thus: "There are serpents in these islands of immoderate size; there is one called *Ibitin*, very long, which suspending itself by the tail from the trunk of a tree, waits till stags, bears, and also men pass by, in order to attract them with its breath, and devour them at once entirely:" from whence it is evident, that this very ancient fable has been common to both continents.

Further, it may be asked, In what country of America could M. de Paw find ants to equal those of the Philippine islands, called *Sulum*, respecting which Hernandez affirms, that they are six fingers broad in length and one in breadth? Who has ever seen in America butterflies so large as those of Bourbon, Ternate, the Philippine isles, and all the Indian archipelago? The largest bat of America (native to hot shady countries), which is that called by Buffon *Vampiro*, is, according to him, of the size of a pigeon. *La Rougette*, one of the species of Asia, is as large as a raven; and the *Rousette*, another species of Asia, is as big as a large hen. Its wings, when extended, measure from tip to tip three Parisian feet, and according to Gemelli, who measured it in the Philippine isles, six palms. M. Buffon acknowledges the excess in size of the Asiatic bat over the American species, but denies it as to number. Gemelli says, that those of the island of Luzon were so numerous that they darkened the air, and that the noise which they made with their teeth, in eating the fruits of the woods, was heard at the distance of two miles. M. de Paw says, in talking of serpents, "it cannot be affirmed that the new world has shown any serpents larger than those which Mr Adanson saw in the deserts of Africa." The greatest serpent found in Mexico, after a diligent search made by Hernandez, was 18 feet long: but this is not to be compared with that of the Moluccas, which Bomare says is 33 feet in length; nor with the *Anocandaja* of Ceylon, which the same author says is more than 33 feet long: nor with others of Asia and Africa, mentioned by the same author. Lastly, the argument drawn from the multitude and size of the American insects is fully as weighty as the argument drawn from the smallness and scarcity of quadrupeds, and both detect the same ignorance, or rather the same voluntary and studied forgetfulness, of the things of the old continent.

With respect to what M. de Paw has said of the tribute of lice in Mexico, in that as well as in many other

things he discovers his ridiculous credulity. It is true America. that Cortes found bags of lice in the magazines of the palace of king Axajacatl. It is also true, that Montezuma imposed such a tribute, not on all his subjects however, but only on those who were beggars; not on account of the extraordinary multitude of those insects, as M. de Paw affirms, but because Montezuma, who could not suffer idleness in his subjects, resolved that that miserable set of people, who could not labour, should at least be occupied in lousing themselves. This was the true reason of such an extravagant tribute, as Torquemada, Betancourt, and other historians relate; and nobody ever before thought of that which M. de Paw affirms, merely because it suited his preposterous system. Those disgusting insects possibly abound as much in the hair and cloaths of American beggars, as of any poor and uncleanly low people in the world: but there is not a doubt, that if any sovereign of Europe was to exact such a tribute from the poor in his dominions, not only bags, but great vessels might be filled with them.

At the time America was discovered, it was found General de- inhabited by a race of men no less different from those scription of the natives. in the other parts of the world, than the climate and natural productions of this continent are different from those of Europe, Asia, or Africa.—One great peculiarity in the native Americans is their colour, and the identity of it throughout the whole extent of the continent. In Europe and Asia, the people who inhabit the northern countries are of a fairer complexion than those who dwell more to the southward. In the torrid zone, both in Africa and Asia, the natives are entirely black, or the next thing to it. This, however, must be understood with some limitation. The people of Lapland, who inhabit the most northerly part of Europe, are by no means so fair as the inhabitants of Britain; nor are the Tartars so fair as the inhabitants of Europe, who lie under the same parallels of latitude. Nevertheless, a Laplander is fair when compared with an Abyssinian, and a Tartar if compared with a native of the Molucca islands.—In America, this distinction of colour was not to be found. In the torrid zone there were no negroes, and in the temperate and frigid zones there were no white people. All of them were of a kind of red copper-colour, which Mr Forster observed, in the Pessierays of Terra del Fuego, to have something of a gloss resembling that metal. It doth not appear, however, that this matter hath ever been inquired into with sufficient accuracy. The inhabitants of the inland parts of South America, where the continent is widest, and consequently the influence of the sun the most powerful, have never been compared with those of Canada, or more northerly parts, at least by any person of credit. Yet this ought to have been done, and that in many instances too, before it could be asserted so positively as most authors do, that there is not the least difference of complexion among the natives of America. Indeed, so many systems have been formed concerning them, that it is very difficult to obtain a true knowledge of the most simple facts.—If we may believe the Abbé Raynal, the Californians are swarthier than the Mexicans; and so positive is he in this opinion, that he gives a reason for it. "This difference of colour," says he, "proves, that the civilized life of society subverts, or totally changes, the order and laws of nature, since

America. we find, under the temperate zone, a savage people that are blacker than the civilized nations of the torrid zone."

—On the other hand, Dr Robertson classes all the inhabitants of Spanish America together with regard to colour, whether they are civilized or uncivilized; and when he speaks of California, takes no notice of any peculiarity in their colour more than others.—The general appearance of the indigenous Americans in various districts is thus described by the chevalier Pinto: "They are all of a copper colour, with some diversity of shade, not in proportion to their distance from the Equator, but according to the degree of elevation of the territory in which they reside. Those who live in a high country are fairer than those in the marshy low lands on the coast. Their face is round; farther removed, perhaps, than that of any people, from an oval shape. Their fore-head is small; the extremity of their ears far from the face; their lips thick; their nose flat; their eyes black, or of a chestnut colour, small, but capable of discerning objects at a great distance. Their hair is always thick and sleek, and without any tendency to curl. At the first aspect, a South-American appears to be mild and innocent; but, on a more attentive view, one discovers in his countenance something wild, distrustful, and sullen."

10
Don Ulloa's
account.

The following account of the native Americans is given by Don Antonio Ulloa, in a work intitled *Mémoires philosophiques, historiques, et physiques, concernant la découverte de l'Amérique*, lately published.

The American Indians are naturally of a colour bordering upon red. Their frequent exposure to the sun and wind changes it to their ordinary dusky hue. The temperature of the air appears to have little or no influence in this respect. There is no perceptible difference in complexion between the inhabitants of the high and those of the low parts of Peru; yet the climates are of an extreme difference. Nay, the Indians who live as far as 40 degrees and upwards south or north of the equator, are not to be distinguished, in point of colour, from those immediately under it.

There is also a general conformation of features and person, which, more or less, characteriseth them all. Their chief distinctions in these respects are a small forehead, partly covered with hair to the eye-brows, little eyes, the nose thin, pointed, and bent towards the upper lip; a broad face, large ears, black, thick, and lank hair; the legs well formed, the feet small, the body thick and muscular; little or no beard on the face, and that little never extending beyond a small part of the chin and upper lip. It may easily be supposed that this general description cannot apply, in all its parts, to every individual; but all of them partake so much of it, that they may easily be distinguished even from the mulattoes, who come nearest to them in point of colour.

The resemblance among all the American tribes is not less remarkable in respect to their genius, character, manners, and particular customs. The most distant tribes are, in these respects, as similar as though they formed but one nation.

All the Indian nations have a peculiar pleasure in painting their bodies of a red colour, with a certain species of earth. The mine of Guancavelica was formerly of no other use than to supply them with this material for dyeing their bodies; and the cinnabar ex-

tracted from it was applied entirely to this purpose. America. The tribes in Louisiana and Canada have the same passion; hence minium is the commodity most in demand there.

It may seem singular that these nations, whose natural colour is red, should affect the same colour as an artificial ornament. But it may be observed, that they do nothing in this respect but what corresponds to the practice of Europeans, who also study to heighten and display to advantage the natural red and white of their complexions. The Indians of Peru have now indeed abandoned the custom of painting their bodies: but it was common among them before they were conquered by the Spaniards; and it still remains the custom of all those tribes who have preserved their liberty. The northern nations of America, besides the red colour which is predominant, employ also black, white, blue, and green, in painting their bodies.

The adjustment of these colours is a matter of as Peculiar-
great consideration with the Indians of Louisiana and ties in re-
the vast regions extending to the north, as the orna-gard to or-
ments of dress among the most polished nations. The nament and
business itself they call *Maftacher*, and they do not fail dress.
to apply all their talents and assiduity to accomplish it in the most finished manner. No lady of the greatest fashion ever consulted her mirror with more anxiety, than the Indians do while painting their bodies. The colours are applied with the utmost accuracy and address. Upon the eye-lids, precisely at the root of the eye-lashes, they draw two lines as fine as the smallest thread; the same upon the lips, the openings of the nostrils, the eye-brows, and the ears; of which last they even follow all the inflexions and insinuosities. As to the rest of the face, they distribute various figures, in all which the red predominates, and the other colours are assorted so as to throw it out to the best advantage. The neck also receives its proper ornaments; a thick coat of vermilion commonly distinguishes the cheeks. Five or six hours are requisite for accomplishing all this with the nicety which they affect. As their first attempts do not always succeed to their wish, they efface them, and begin a-new upon a better plan. No coquette is more fastidious in her choice of ornament, none more vain when the important adjustment is finished. Their delight and self-satisfaction are then so great, that the mirror is hardly ever laid down. An Indian *Maftached* to his mind is the vainest of all the human species. The other parts of the body are left in their natural state, and, excepting what is called a *cachecul*, they go entirely naked.

Such of them as have made themselves eminent for bravery, or other qualifications, are distinguished by figures painted on their bodies. They introduce the colours by making punctures on their skin, and the extent of surface which this ornament covers is proportioned to the exploits they have performed. Some paint only their arms, others both their arms and legs; others again their thighs, while those who have attained the summit of warlike renown, have their bodies painted from the waist upwards. This is the heraldry of the Indians; the devices of which are probably more exactly adjusted to the merits of the persons who bear them, than those of more civilized countries.

Besides these ornaments, the warriors also carry plumes

America. plumes of feathers on their heads, their arms, and ancles. These likewise are tokens of valour, and none but such as have been thus distinguished may wear them.

The propensity to indolence is equal among all the tribes of Indians, civilized or savage. The only employment of those who have preserved their independence is hunting and fishing. In some districts the women exercise a little agriculture, in raising Indian corn and pumpkins, of which they form a species of aliment, by bruising them together: they also prepare the ordinary beverage in use among them, taking care, at the same time, of the children, of whom the fathers take no charge.

The female Indians of all the conquered regions of South America practise what is called the *urcu* (a word which among them signifies *elevation*). It consists in throwing forward the hair from the crown of the head upon the brow, and cutting it round from the ears to above the eye; so that the forehead and eye-brows are entirely covered. The same custom takes place in the Northern countries. The female inhabitants of both regions tie the rest of their hair behind, so exactly on the same fashion, that it might be supposed the effect of mutual imitation. This however being impossible, from the vast distance that separates them, is thought to countenance the supposition of the whole of America being originally planted with one race of people.

This custom does not take place among the males. Those of the higher parts of Peru wear long and flowing hair, which they reckon a great ornament. In the lower parts of the same country they cut it short, on account of the heat of the climate; a circumstance in which they imitate the Spaniards. The inhabitants of Louisiana pluck out their hair by the root, from the crown of the head forwards, in order to obtain a large forehead, otherwise denied them by nature. The rest of their hair they cut as short as possible, to prevent their enemies from seizing them by it in battle, and also to prevent them from easily getting their scalp, should they fall into their hands as prisoners.

12
Remark-
able insen-
sibility to
pain,

The whole race of American Indians is distinguished by thickness of skin and hardness of fibres; circumstances which probably contribute to that insensibility to bodily pain for which they are remarkable. An instance of this insensibility occurred in an Indian who was under the necessity of submitting to be cut for the stone. This operation, in ordinary cases, seldom lasts above four or five minutes. Unfavourable circumstances in his case prolonged it to the uncommon period of 27 minutes. Yet all this time the patient gave no tokens of the extreme pain commonly attending this operation: he complained only as a person does who feels some slight uneasiness. At last the stone was extracted. Two days after, he expressed a desire for food, and on the eighth day from the operation he quitted his bed, free from pain, although the wound was not yet thoroughly closed. The same want of sensibility is observed in cases of fractures, wounds, and other accidents of a similar nature. In all these cases their cure is easily effected, and they seem to suffer less present pain than any other race of men. The skulls that have been taken up in their ancient burying-grounds are of a greater thickness than that bone is commonly found, being from six to seven lines from

the outer to the inner superficies. The same is remarked as to the thickness of their skins.

America.

It is natural to infer from hence, that their comparative insensibility to pain is owing to a coarser and stronger organization, than that of other nations. The ease with which they endure the severities of climate is another proof of this. The inhabitants of the higher parts of Peru live amidst perpetual frost and snow. Although their clothing is very slight, they support this inclement temperature without the least inconvenience. Habit, it is to be confessed, may contribute a good deal to this, but much also is to be ascribed to the compact texture of their skin, which defends them from the impression of cold through their pores.

13
And to the
inclemen-
cies of wea-
ther.

The northern Indians resemble them in this respect. The utmost rigours of the winter season do not prevent them from following the chase almost naked. It is true, they wear a kind of woollen cloak, or sometimes the skin of a wild beast, upon their shoulders; but besides that it covers only a small part of their body, it would appear that they use it rather for ornament than warmth. In fact, they wear it indiscriminately, in the severities of winter and in the sultriest heats of summer, when neither Europeans nor Negroes can suffer any but the slightest cloathing. They even frequently throw aside this cloak when they go a-hunting, that it may not embarrass them in traversing their forests, where they say the thorns and undergrowth would take hold of it; while, on the contrary, they slide smoothly over the surface of their naked bodies. At all times they go with their heads uncovered, without suffering the least inconvenience, either from the cold, or from those *coups de soleil*, which in Louisiana are so often fatal to the inhabitants of other climates.

The Indians of South America distinguish themselves by modern dresses, in which they affect various tastes. Those of the high country, and of the valleys in Peru, dress partly in the Spanish fashion. Instead of hats they wear bonnets of coarse double cloth, the weight of which neither seems to incommode them when they go to warmer climates, nor does the accidental want of them seem to be felt in situations where the most piercing cold reigns. Their legs and feet are always bare, if we except a sort of sandals made of the skins of oxen. The inhabitants of South America, compared with those of North America, are described as generally more feeble in their frame; less vigorous in the efforts of their mind; of gentler dispositions, more addicted to pleasure, and sunk in indolence.— This, however, is not universally the case. Many of their nations are as intrepid and enterprising as any others on the whole continent. Among the tribes on the banks of the Oronoko, if a warrior aspires to the post of captain, his probation begins with a long fast, more rigid than any ever observed by the most abstermious hermit. At the close of this the chiefs assemble; and each gives him three lashes with a large whip, applied so vigorously, that his body is almost flayed. If he betrays the least symptom of impatience, or even of sensibility, he is disgraced for ever, and rejected as unworthy of the honour. After some interval, his constancy is proved by a more excruciating trial. He is laid in his hammock with his hands bound fast; and an innumerable multitude of venomous ants,

14
Terrible
trials un-
dergone by
their chiefs.

whose

America. whose bite occasions a violent pain and inflammation, are thrown upon him. The judges of his merit stand around the hammock; and whilst these cruel insects fasten upon the most sensible parts of his body, a sigh, a groan, or an involuntary motion expressive of what he suffers, would exclude him from the dignity of which he is ambitious. Even after this evidence, his fortitude is not deemed to be sufficiently ascertained, till he has stood another test more severe, if possible, than the former. He is again suspended in his hammock, and covered with the leaves of the palmetto. A fire of stinking herbs is kindled underneath, so as he may feel its heat, and be involved in smoke. Though scorched and almost suffocated, he must continue to endure this with the same patient insensibility. Many perish in this essay of their firmness and courage; but such as go through it with applause, receive the ensigns of their new dignity with much solemnity, and are ever after regarded as leaders of approved resolution, whose behaviour, in the most trying situations, will do honour to their country. In North America, the previous trial of a warrior is neither so formal nor so severe: Though, even there, before a youth is permitted to bear arms, his patience and fortitude are proved by blows, by fire, and by insults, more intolerable to a haughty spirit than either.

15
Customs
and dispo-
sitions of
the North
Americans
more parti-
cularly.

Of the manners and customs of the North Americans more particularly, the following is the most consistent account that can be collected from the best informed and most impartial writers.

When the Europeans first arrived in America, they found the Indians quite naked, except those parts which even the most uncultivated people usually conceal. Since that time, however, they generally use a coarse blanket, which they buy of the neighbouring planters.

Their huts or cabbins are made of stakes of wood driven into the ground, and covered with branches of trees or reeds. They lie on the floor either on mats or the skins of wild beasts. Their dishes are of timber; but their spoons are made of the skulls of wild oxen, and their knives of flint. A kettle and a large plate constitute almost the whole utensils of the family. Their diet consists chiefly in what they procure by hunting; and sagamite, or pottage, is likewise one of their most common kinds of food. The most honourable furniture amongst them is the scalps of their enemies; with those they ornament their huts, which are esteemed in proportion to the number of this sort of spoils.

16
Their re-
markable
pensive-
ness and tacit-
urnity.

The character of the Indians is altogether founded upon their circumstances and way of life. A people who are constantly employed in procuring the means of a precarious subsistence, who live by hunting the wild animals, and who are generally engaged in war with their neighbours, cannot be supposed to enjoy much gaiety of temper, or a high flow of spirits. The Indians therefore are in general grave even to sadness; they have nothing of that giddy vivacity peculiar to some nations of Europe, and they despise it. Their behaviour to those about them is regular, modest, and respectful. Ignorant of the arts of amusement, of which that of laying trifles agreeably is one of the most considerable, they never speak but when they have something important to observe; and all their actions,

No 14.

words, and even looks, are attended with some meaning. This is extremely natural to men who are almost continually engaged in pursuits, which to them are of the highest importance. Their subsistence depends entirely on what they procure with their hands; and their lives, their honour, and every thing dear to them, may be lost by the smallest inattention to the designs of their enemies. As they have no particular object to attach them to one place rather than another, they fly wherever they expect to find the necessaries of life in greatest abundance. Cities, which are the effects of agriculture and arts, they have none. The different tribes or nations are for the same reason extremely small, when compared with civilized societies, in which industry, arts, agriculture, and commerce, have united a vast number of individuals, whom a complicated luxury renders useful to one another. These small tribes live at an immense distance; they are separated by a desert frontier, and hid in the bosom of impenetrable and almost boundless forests.

There is established in each society a certain species of government, which over the whole continent of America prevails with exceeding little variation; because over the whole of this continent the manners and way of life are nearly similar and uniform. Without arts, riches, or luxury, the great instruments of subjection in polished societies, an American has no method by which he can render himself considerable among his companions, but by superiority in personal qualities of body or mind. But as Nature has not been very lavish in her personal distinctions, where all enjoy the same education, all are pretty much equal, and will desire to remain so. Liberty, therefore, is the prevailing passion of the Americans; and their government, under the influence of this sentiment, is better secured than by the wisest political regulations. They are very far, however, from despising all sort of authority; they are attentive to the voice of wisdom, which experience has conferred on the aged, and they enlist under the banners of the chief in whose valour and military address they have learned to repose their confidence. In every society, therefore, there is to be considered the power of the chief and of the elders; and according as the government inclines more to the one or to the other, it may be regarded as monarchical, or as a species of aristocracy. Among those tribes which are most engaged in war, the power of the chief is naturally predominant; because the idea of having a military leader was the first source of his superiority, and the continual exigencies of the state requiring such a leader, will continue to support, and even to enhance it. His power, however, is rather persuasive than coercive; he is revered as a father, rather than feared as a monarch. He has no guards, no prisons, no officers of justice, and one act of ill-judged violence would pull him from the throne. The elders, in the other form of government, which may be considered as an aristocracy, have no more power. In some tribes, indeed, there are a kind of hereditary nobility, whose influence being constantly augmented by time, is more considerable. (See the article NIAGARA.) But this source of power, which depends chiefly on the imagination, by which we annex to the merit of our contemporaries that of their forefathers, is too refined to be very common among the natives of America. In

17

Form of go-
vernment
among
them.

most

¹⁸ ^{America.} most countries, therefore, age alone is sufficient for acquiring respect, influence, and authority. It is age which teaches experience, and experience is the only source of knowledge among a barbarous people. Among those persons business is conducted with the utmost simplicity, and which may recal to those who are acquainted with antiquity a picture of the most early ages. The heads of families meet together in a house or cabin appointed for the purpose. Here the business is discussed; and here those of the nation, distinguished for their eloquence or wisdom, have an opportunity of displaying those talents. Their orators, like those of Homer, express themselves in a bold figurative style, stronger than refined, or rather softened nations can well bear, and with gestures equally violent, but often extremely natural and expressive. When the business is over, and they happen to be well provided with food, they appoint a feast upon the occasion, of which almost the whole nation partakes. The feast is accompanied with a song, in which the real or fabulous exploits of their forefathers are celebrated. They have dances too, though, like those of the Greeks and Romans, chiefly of the military kind; and their music and dancing accompany every feast.

¹⁹ ^{Wampum or belts.} To assist their memory, they have belts of small shells, or beads, of different colours, each representing a particular object, which is marked by their colour and arrangement. At the conclusion of every subject on which they discourse, when they treat with a foreign state, they deliver one of those belts; for if this ceremony should be omitted, all that they have said passes for nothing. Those belts are carefully deposited in each town, as the public records of the nation; and to them they occasionally have recourse, when any public contest happens with a neighbouring tribe. Of late, as the materials of which those belts are made have become scarce, they often give some skin in place of the wampum (the name of the beads), and receive in return presents of a more valuable kind from our commissioners; for they never consider a treaty as of any weight, unless every article in it be ratified by such a gratification.

²⁰ ^{Their wars.} It often happens, that those different tribes or nations, scattered as they are at an immense distance from one another, meet in their excursions after prey. If there subsists no animosity between them, which seldom is the case, they behave in the most friendly and courteous manner; but if they happen to be in a state of war, or if there has been no previous intercourse between them, all who are not friends are deemed enemies, and they fight with the most savage fury.

War, if we except hunting, is the only employment of the men; as to every other concern, and even the little agriculture they enjoy, it is left to the women. Their most common motive for entering into war, when it does not arise from an accidental rencounter or interference, is either to revenge themselves for the death of some lost friends, or to acquire prisoners, who may assist them in their hunting, and whom they adopt into their society. These wars are either undertaken by some private adventurers, or at the instance of the whole community. In the latter case, all the young men who are disposed to go out to battle (for no one is compelled contrary to his inclination), give a bit of wood to the chief, as a token of their design to ac-

VOL. I. Part II.

company him; for every thing among these people is transacted with a great deal of ceremony and many forms. The chief who is to conduct them fasts several days, during which he converses with no one, and is particularly careful to observe his dreams; which the presumption natural to savages generally renders as favourable as he could desire. A variety of other superstitions and ceremonies are observed. One of the most hideous is setting the war-kettle on the fire, as an emblem that they are going out to devour their enemies; which among some nations must formerly have been the case, since they still continue to express it in clear terms, and use an emblem significant of the ancient usage. Then they dispatch a porcelane, or large shell, to their allies, inviting them to come along, and drink the blood of their enemies. For with the Americans, as with the Greeks of old,

“ A generous friendship no cold medium knows;
“ But with one love, with one resentment, glows.”

They think that those in their alliance must not only adopt their enmities, but have their resentment wound up to the same pitch with themselves. And indeed no people carry their friendships or their resentment so far as they do; and this is what should be expected from their peculiar circumstances: that principle in human nature which is the spring of the social affections, acts with so much the greater force the more it is restrained. The Americans, who live in small societies, who see few objects and few persons, become wonderfully attached to these objects and persons, and cannot be deprived of them without feeling themselves miserable. Their ideas are too confined to enable them to entertain just sentiments of humanity, or universal benevolence. But this very circumstance, while it makes them cruel and savage to an incredible degree towards those with whom they are at war, adds a new force to their particular friendships, and to the common tie which unites the members of the same tribe, or of those different tribes which are in alliance with one another. Without attending to this reflection, some facts we are going to relate would excite our wonder without informing our reason, and we would be bewildered in a number of particulars, seemingly opposite to one another, without being sensible of the general cause from which they proceed.

Having finished all the ceremonies previous to the war, and the day appointed for their setting out on the expedition being arrived, they take leave of their friends, and exchange their clothes, or whatever moveables they have, in token of mutual friendship; after which they proceed from the town, their wives and female relations walking before, and attending them to some distance. The warriors march all dressed in their finest apparel and most showy ornaments, without any order. The chief walks slowly before them, singing the war-song, while the rest observe the most profound silence. When they come up to their women, they deliver them all their finery, and putting on their worst clothes, proceed on their expedition.

²² ^{Ensigns.} Every nation has its peculiar ensign or standard, which is generally some beast, bird, or fish. Those among the Five Nations are the bear, otter, wolf, tortoise, and eagle; and by these names the tribes are usually distinguished. They have the figures of those animals

²³ Military habits. ^{America.} animals pricked and painted on several parts of their bodies; and when they march through the woods, they commonly, at every encampment, cut the representation of their ensign on trees, especially after a successful campaign: marking at the same time the number of scalps or prisoners they have taken. Their military dress is extremely singular. They cut off or pull out all their hair, except a spot about the breadth of two English crown-pieces, near the top of their heads, and entirely destroy their eye-brows. The lock left upon their heads is divided into several parcels, each of which is stiffened and adorned with wampum, beads, and feathers of various kinds, the whole being twisted into a form much resembling the modern pom-poon. Their heads are painted red down to the eye-brows, and sprinkled over with white down. The gristles of their ears are split almost quite round, and distended with wires or splinters so as to meet and tie together on the nape of the neck. These are also hung with ornaments, and generally bear the representation of some bird or beast. Their noses are likewise bored and hung with trinkets of beads, and their faces painted with various colours so as to make an awful appearance. Their breasts are adorned with a gorget or medal, of brass, copper, or some other metal; and that dreadful weapon the scalping-knife hangs by a string from their neck.

²⁴ Quickness of their senses. The great qualities in an Indian war are vigilance and attention, to give and to avoid a surprise; and indeed in these they are superior to all nations in the world. Accustomed to continual wandering in the forests, having their perceptions sharpened by keen necessity, and living in every respect according to nature, their external senses have a degree of acuteness which at first view appears incredible. They can trace out their enemies at an immense distance by the smoke of their fires, which they smell, and by the tracks of their feet on the ground, imperceptible to an European eye, but which they can count and distinguish with the utmost facility. They can even distinguish the different nations with whom they are acquainted, and can determine the precise time when they passed, where an European could not, with all his glasses, distinguish footsteps at all. These circumstances, however, are of small importance, because their enemies are no less acquainted with them. When they go out, therefore, they take care to avoid making use of any thing by which they might run the danger of a discovery. They light no fire to warm themselves or to prepare their victuals: they lie close to the ground all day, and travel only in the night; and marching along in files, he that closes the rear diligently covers with leaves the tracks of his own feet and of theirs who preceded him. When they halt to refresh themselves, scouts are sent out to reconnoitre the country and beat up every place where they suspect an enemy to lie concealed. In this manner they enter unawares the villages of their foes; and while the flower of the nation are engaged in hunting, massacre all the children, women, and helpless old men, or make prisoners of as many as they can manage, or have strength enough to be useful to their nation. But when the enemy is apprised of their design, and coming on in arms against them, they throw themselves flat on the ground among the withered herbs and leaves, which their faces are

Painted to resemble. Then they allow a part to pass ^{America.} unmolested, when all at once, with a tremendous shout, rising up from their ambush, they pour a storm of ²⁶ musket-bullets on their foes. The party attacked returns the same cry. Every one shelters himself with fighting. a tree, and returns the fire of the adverse party, as soon as they raise themselves from the ground to give a second fire. Thus does the battle continue until the one party is so much weakened as to be incapable of farther resistance. But if the force on each side continues nearly equal, the fierce spirits of the savages, inflamed by the loss of their friends, can no longer be restrained. They abandon their distant war, they rush upon one another with clubs and hatchets in their hands, magnifying their own courage, and insulting their enemies with the bitterest reproaches. A cruel combat ensues, death appears in a thousand hideous forms, which would congeal the blood of civilized nations to behold, but which rouse the fury of savages. They trample, they insult over the dead bodies, tearing the scalp from the head, wallowing in their blood like wild beasts, and sometimes devouring their flesh. The flame rages on till it meets with no resistance; then the prisoners are secured, those unhappy men, whose fate is a thousand times more dreadful than theirs who have died in the field. The conquerors set up a hideous howling to lament the friends they have lost. They approach in a melancholy and severe gloom to their own village; a messenger is sent to announce their arrival, and the women, with frightful shrieks, come out to mourn their dead brothers or their husbands. When they are arrived, the chief relates in a low voice to the elders, a circumstantial account of every particular of the expedition. The orator proclaims aloud this account to the people; and as he mentions the names of those who have fallen, the shrieks of the women are redoubled. The men too join in these cries, according as each is most connected with the deceased by blood or friendship. The last ceremony is the proclamation of the victory; each individual then forgets his private misfortunes, and joins in the triumph of his nation; all tears are wiped from their eyes, and by an unaccountable transition, they pass in a moment from the bitterness of sorrow to an extravagance of joy. But the treatment of the prisoners, whose fate all this time remains undecided, is what chiefly characterises the savages.

We have already mentioned the strength of their affections or resentments. United as they are in small societies, connected within themselves by the firmest ties, their friendly affections, which glow with the most intense warmth within the walls of their own village, seldom extend beyond them. They feel nothing for the enemies of their nation; and their resentment is easily extended from the individual who has injured them to all others of the same tribe. The prisoners, who have themselves the same feelings, know the intentions of their conquerors, and are prepared for them. ²⁷ The person who has taken the captive attends him to Treatment the cottage, where, according to the distribution made of their prisoners by the elders, he is to be delivered to supply the loss of a citizen. If those who receive him have their family weakened by war or other accidents, they adopt the captive into the family, of which he becomes a member. But if they have no occasion for him, or their

²⁸ Shocking tortures. America. their resentment for the loss of their friends be too high to endure the sight of any connected with those who were concerned in it, they sentence him to death. All those who have met with the same severe sentence being collected, the whole nation is assembled at the execution, as for some great solemnity. A scaffold is erected, and the prisoners are tied to the stake, where they commence their death-song, and prepare for the ensuing scene of cruelty with the most undaunted courage. Their enemies, on the other side, are determined to put it to the proof, by the most refined and exquisite tortures. They begin at the extremity of his body, and gradually approach the more vital parts. One plucks out his nails by the roots, one by one; another takes a finger into his mouth, and tears off the flesh with his teeth; a third thrusts the finger, mangled as it is, into the bowl of a pipe made red-hot, which he smokes like tobacco; then they pound his toes and fingers to pieces between two stones; they cut circles about his joints, and gashes in the fleshy parts of his limbs, which they sear immediately with red hot irons, cutting, burning, and pinching them alternately; they pull off this flesh, thus mangled and roasted, bit by bit, devouring it with greediness, and smearing their faces with the blood in an enthusiasm of horror and fury. When they have thus torn off the flesh, they twist the bare nerves and tendons about an iron, tearing and snapping them, whilst others are employed in pulling and extending their limbs in every way that can increase the torment. This continues often five or six hours; and sometimes, such is the strength of the savages, days together. Then they frequently unbind him, to give a breathing to their fury, to think what new torments they shall inflict, and to refresh the strength of the sufferer, who, wearied out with such a variety of unheard-of torments, often falls into so profound a sleep, that they are obliged to apply the fire to awake him, and renew his sufferings. He is again fastened to the stake, and again they renew their cruelty; they stick him all over with small matches of wood that easily takes fire, but burns slowly; they continually run sharp reeds into every part of his body; they drag out his teeth with pincers, and thrust out his eyes; and lastly, after having burned his flesh from the bones with slow fires; after having so mangled the body that it is all but one wound; after having mutilated his face in such a manner as to carry nothing human in it; after having peeled the skin from the head, and poured a heap of red hot coals or boiling water on the naked skull—they once more unbind the wretch; who, blind, and staggering with pain and weakness, assaulted and pelted upon every side with clubs and stones, now up, now down, falling into their fires at every step, runs hither and thither, until one of the chiefs, whether out of compassion, or weary of cruelty, puts an end to his life with a club or dagger. The body is then put into a kettle, and this barbarous employment is succeeded by a feast as barbarous.

The women, forgetting the human as well as the female nature, and transformed into something worse than furies, even outdo the men in this scene of horror; while the principal persons of the country sit round the stake, smoking and looking on without the least emotion. What is most extraordinary, the sufferer himself, in the little intervals of his torments,

smokes too, appears unconcerned, and converses with his torturers about indifferent matters. Indeed, during the whole time of his execution, there seems a contest which shall exceed, they in inflicting the most horrid pains, or he in enduring them with a firmness and constancy almost above human: not a groan, not a sigh, not a distortion of countenance, escapes him; he possesses his mind entirely in the midst of his torments; he recounts his own exploits; he informs them what cruelties he has inflicted upon their countrymen, and threatens them with the revenge that will attend his death; and, though his reproaches exasperate them to a perfect madness of rage and fury, he continues his insults even of their ignorance of the art of tormenting, pointing out himself more exquisite methods, and more sensible parts of the body to be afflicted. The women have this part of courage as well as the men; and it is as rare for an Indian to behave otherwise as it would be for any European to suffer as an Indian. Such is the wonderful power of an early institution, and a ferocious thirst of glory. "I am brave and intrepid (exclaims the savage in the face of his tormentors); I do not fear death, nor any kind of tortures; those who fear them are cowards; they are less than women; life is nothing to those that have courage: May my enemies be confounded with despair and rage! Oh! that I could devour them, and drink their blood to the last drop."

³⁰ Surprising contrast in the American character. But neither the intrepidity on one side, nor the inflexibility on the other, are among themselves matter of astonishment: for vengeance, and fortitude in the midst of torment, are duties which they consider as sacred; they are the effects of their earliest education, and depend upon principles instilled into them from their infancy. On all other occasions they are humane and compassionate. Nothing can exceed the warmth of their affection towards their friends, who consist of all those who live in the same village, or are in alliance with it: among these all things are common; and this, though it may in part arise from their not possessing very distinct notions of separate property, is chiefly to be attributed to the strength of their attachment; because in every thing else, with their lives as well as their fortunes, they are ready to serve their friends. Their houses, their provisions, even their young women, are not enough to oblige a guest. Has any one of these succeeded ill in his hunting? Has his harvest failed? or is his house burned? He feels no other effect of his misfortunes, than that it gives him an opportunity to experience the benevolence and regard of his fellow-citizens. On the other hand, to the enemies of his country, or to those who have privately offended, the American is implacable. He conceals his sentiments, he appears reconciled until by some treachery or surprise he has an opportunity of executing an horrible revenge. No length of time is sufficient to allay his resentment; no distance of place great enough to protect the object; he crosses the steepest mountains, he pierces the most impracticable forests, and traverses the most hideous bogs and deserts for several hundreds of miles; bearing the inclemency of the seasons, the fatigue of the expedition, the extremes of hunger and thirst, with patience and cheerfulness, in hopes of surprising his enemy, on whom he exercises the most shocking barbarities, even to the eating of his flesh. To such extremes

America. tremes do the Indians push their friendship or their enmity; and such indeed, in general, is the character of all strong and uncultivated minds.

31
Treatment
of their
dead
friends.

But what we have said respecting the Indians would be a faint picture, did we omit observing the force of their friendship, which principally appears by the treatment of their dead. When any one of the society is cut off, he is lamented by the whole: on this occasion a thousand ceremonies are practised, denoting the most lively sorrow. No business is transacted, however pressing, till all the pious ceremonies due to the dead are performed. The body is washed, anointed, and painted. Then the women lament the loss with hideous howlings, intermixed with songs which celebrate the great actions of the deceased and his ancestors. The men mourn in a less extravagant manner. The whole village is present at the interment, and the corpse is habited in their most sumptuous ornaments. Close to the body of the defunct are placed his bows and arrows, with whatever he valued most in his life, and a quantity of provision for his subsistence on the journey which he is supposed to take. This solemnity, like every other, is attended with feasting. The funeral being ended, the relations of the deceased confine themselves to their huts for a considerable time to indulge their grief. After an interval of some weeks they visit the grave, repeat their sorrow, new clothe the remains of the body, and act over again all the solemnities of the funeral.

Among the various tokens of their regard for their deceased friends, the most remarkable is what they call the *feast of the dead*, or the *feast of souls*. The day for this ceremony is appointed in the council of their chiefs, who give orders for every thing which may enable them to celebrate it with pomp and magnificence; and the neighbouring nations are invited to partake of the entertainment. At this time, all who have died since the preceding feast of the kind are taken out of their graves. Even those who have been interred at the greatest distance from the villages are diligently sought for, and conducted to this rendezvous of the dead, which exhibits a scene of horror beyond the power of description. When the feast is concluded, the bodies are dressed in the finest skins which can be procured, and after being exposed for some time in this pomp, are again committed to the earth with great solemnity, which is succeeded by funeral games.

32
Supersti-
tions.

Their taste for war, which forms the chief ingredient in their character, gives a strong bias to their religion. Areskouï, or the god of battle, is revered as the great god of the Indians. Him they invoke before they go into the field; and according as his disposition is more or less favourable to them, they conclude they will be more or less successful. Some nations worship the sun and moon; among others there are a number of traditions, relative to the creation of the world and the history of the gods: traditions which resemble the Grecian fables, but which are still more absurd and inconsistent. But religion is not the prevailing character of the Indians; and except when they have some immediate occasion for the assistance of their gods, they pay them no sort of worship. Like all rude nations, however, they are strongly addicted to superstition. They believe in the existence of a number of good and bad genii or spirits, who inter-

fere in the affairs of mortals, and produce all our happiness or misery. It is from the evil genii, in particular, that our diseases proceed; and it is to the good genii we are indebted for a cure. The ministers of the genii are the jugglers, who are also the only physicians among the savages. These jugglers are supposed to be inspired by the good genii, most commonly in their dreams, with the knowledge of future events; they are called in to the assistance of the sick, and are supposed to be informed by the genii whether they will get over the disease, and in what way they must be treated. But these spirits are extremely simple in their system of physic, and, in almost every disease, direct the juggler to the same remedy. The patient is inclosed in a narrow cabin, in the midst of which is a stone red-hot; on this they throw water, until he is well soaked with the warm vapour and his own sweat. Then they hurry him from this bagnio, and plunge him suddenly into the next river. This coarse method, which costs many their lives, often performs very extraordinary cures. The jugglers have likewise the use of some specifics of wonderful efficacy; and all the savages are dexterous in curing wounds by the application of herbs. But the power of these remedies is always attributed to the magical ceremonies with which they are administered.

33
Condition
of domestic
economy, their
condition is far
from being so
slavish as it
appears. On the
contrary, the
greatest respect
is paid by the
men to the female
sex.

Though the women generally bear the laborious part of domestic economy, their condition is far from being so slavish as it appears. On the contrary, the greatest respect is paid by the men to the female sex. The women even hold their councils, and have their share in all deliberations which concern the state. Polygamy is practised by some nations, but is not general. In most, they content themselves with one wife; but a divorce is admitted in case of adultery. No nation of the Americans is without a regular marriage, in which there are many ceremonies; the principal of which is, the bride's presenting the bridegroom with a plate of their corn. The women, though before incontinent, are remarkable for chastity after marriage.

34
Liberty, in its full extent, being the darling passion of the Indians, their education is directed in such a manner as to cherish this disposition to the utmost. Hence children are never upon any account chastised with blows, and they are seldom even reprimanded. Reason, they say, will guide their children when they come to the use of it, and before that time their faults cannot be very great: but blows might damp their free and martial spirit, by the habit of a slavish motive to action. When grown up, they experience nothing like command, dependence, or subordination; even strong persuasion is industriously withheld by those who have influence among them.—No man is held in great esteem, unless he has increased the strength of his country with a captive, or adorned his hut with a scalp of one of his enemies.

Controversies among the Indians are few, and quickly decided. When any criminal matter is so flagrant as to become a national concern, it is brought under the jurisdiction of the great council; but in ordinary cases, the crime is either revenged or compromised by the parties concerned. If a murder be committed, the family which has lost a relation prepares to retaliate on that of the offender. They often kill the murderer; and when this happens, the kindred of the last person slain

35
Crimes and
punish-
ments.

America. slain look upon themselves to be as much injured, and to have the same right to vengeance as the other party. In general, however, the offender absents himself; the friends send compliments of condolence to those of the person that has been murdered. The head of the family at length appears with a number of presents, the delivery of which he accompanies with a formal speech. The whole ends, as usual, in mutual feasting, songs, and dances. If the murder is committed by one of the same family or cabin, that cabin has the full right of judgment within itself, either to punish the guilty with death, or to pardon him, or to oblige him to give some recompence to the wife or children of the slain. Instances of such a crime, however, very seldom happen; for their attachment to those of the same family is remarkably strong, and is said to produce such friendships as may vie with the most celebrated in fabulous antiquity.

36
Peculiar
manners of
different
nations.

Such, in general, are the manners and customs of the Indian nations; but every tribe has something peculiar to itself. Among the Hurons and Natchez, the dignity of the chief is hereditary, and the right of succession in the female line. When this happens to be extinct, the most respectable matron of the tribe makes choice of whom she pleases to succeed.

The Cherokees are governed by several sachems or chiefs, elected by the different villages; as are also the Creeks and Chactaws. The two latter punish adultery in a woman by cutting off her hair, which they will not suffer to grow till the corn is ripe the next season; but the Illinois, for the same crime, cut off the women's noses and ears.

The Indians on the lakes are formed into a sort of empire; and the emperor is elected from the eldest tribe, which is that of the Ottowawas. He has the greatest authority of any chief that has appeared on the continent since our acquaintance with it. A few years ago, the person who held this rank formed a design of uniting all the Indian nations under his sovereignty; but he miscarried in the attempt.

37
Longevity
of the In-
dians.

In general, the American Indians live to a great age, although it is not possible to know from themselves the exact number of their years. It was asked of an Indian, who appeared to be extremely old, what age he was of? I am above twenty, was his reply. Upon putting the question in a different form, by reminding him of certain circumstances in former times, My machu, said he, spoke to me when I was young of the Incas; and he had seen these princes. According to this reply, there must have elapsed, from the date of his machu's (his grandfather's) remembrance to that time, a period of at least 232 years. The man who made this reply appeared to be 120 years of age: for, besides the whiteness of his hair and beard, his body was almost bent to the ground; without, however, showing any other marks of debility or suffering. This happened in 1764. This longevity, attended in general with uninterrupted health, is probably the consequence in part of their vacancy from all serious thought and employment, joined also with the robust texture and conformation of their bodily organs. If the Indians did not destroy one another in their almost perpetual wars, and if their habits of intoxication were not so universal and incurable, they would be, of all the races of men who inhabit the globe, the most likely to prolong, not only

the bounds, but the enjoyments, of animal life to their utmost duration. **America.**

Let us now attend to other pictures which have been given of the aboriginal inhabitants of the New World. The vices and defects of the American Indians have by several writers been most unaccountably aggravated, and every virtue and good quality denied them. Their cruelties have been already described and accounted for. The following anecdote of an Algonquin woman we find adduced as a remarkable proof of their innate thirst of blood. That nation being at war with the Iroquois, she happened to be made prisoner, and was carried to one of the villages belonging to them. Here she was stripped naked, and her hands and feet bound with ropes in one of their cabins. In this condition she remained ten days, the savages sleeping round her every night. The eleventh night, while they were asleep, she found means to disengage one of her hands, with which she immediately freed herself from the ropes, and went to the door. Though she had now an opportunity of escaping unperceived, her revengeful temper could not let slip so favourable an opportunity of killing one of her enemies. The attempt was manifestly at the hazard of her own life; yet, snatching up a hatchet, she killed the savage that lay next her; and, springing out of the cabin, concealed herself in a hollow tree which she had observed the day before. The groans of the dying person soon alarmed the other savages, and the young ones immediately set out in pursuit of her.—Perceiving from her tree, that they all directed their course one way, and that no savage was near her, she left her sanctuary, and, flying by an opposite direction, ran into a forest without being perceived. The second day after this happened, her footsteps were discovered, and they pursued her with such expedition, that the third day she discovered her enemies at her heels. Upon this she threw herself into a pond of water; and, diving among some weeds and bulrushes, she could just breathe above water without being perceived. Her pursuers, after making the most diligent search, were forced to return.—For 35 days this woman held on her course through woods and deserts, without any other sustenance than roots and wild berries. When she came to the river St Lawrence, she made with her own hands a kind of a wicker raft, on which she crossed it. As she went by the French fort Trois Rivières, without well knowing where she was, she perceived a canoe full of savages; and, fearing they might be Iroquois, ran again into the woods, where she remained till sunset.—Continuing her course, soon after she saw Trois Rivières; and was then discovered by a party whom she knew to be Hurons, a nation in alliance with the Algonquins. She then squatted down behind a bush, calling out to them that she was not in a condition to be seen, because she was naked. They immediately threw her a blanket, and then conducted her to the fort, where she recounted her story.

Personal courage has been denied them. In proof of their pusillanimity, the following incidents are quoted from Charlevoix by Lord Kames, in his Sketches of the History of Man. “The fort de Vercheres in Canada, belonging to the French, was, in the year 1690, at

38
Other pic-
tures of the
Americana.

39
Anecdotes
of an Al-
gonquin
woman.

40
Reproach-
ed with pu-
sillanimity.

America. attacked by some Iroquois. They approached silently, preparing to scale the palisade, when some musket-shot made them retire. Advancing a second time, they were again repulsed, wondering that they could discover none but a woman, who was seen every where. This was Madame de Vercheres, who appeared as resolute as if supported by a numerous garrison. The hopes of storming a place without men to defend it, occasioned reiterated attacks. After two days siege, they retired, fearing to be intercepted in their retreat. Two years after, a party of the same nation appeared before the fort, so unexpectedly, that a girl of fourteen, daughter of the proprietor, had but time to shut the gate. With the young woman there was not a soul but one raw soldier. She showed herself with her assistant, sometimes in one place and sometimes in another; changing her dress frequently, in order to give some appearance of a garrison; and always fired opportunely. The faint-hearted Iroquois decamped without success."

There is no instance, it is said, either of a single Indian facing an individual of any other nation in fair and open combat, or of their jointly venturing to try the fate of battle with an equal number of any foes. Even with the greatest superiority of numbers, they dare not meet an open attack. Yet, notwithstanding this want of courage, they are still formidable; nay, it has been known, that a small party of them has routed a much superior body of regular troops: but this can only happen when they have surprised them in the fastnesses of their forests, where the covert of the wood may conceal them until they take their aim with the utmost certainty. After one such discharge they immediately retreat, without leaving the smallest trace of their route. It may easily be supposed, that an onset of this kind must produce confusion even among the steadiest troops, when they can neither know the number of their enemies, nor perceive the place where they lie in ambush.

41
Accused of
perfidy.

Perfidy combined with cruelty has been also made a part of their character. Don Ulloa relates, That the Indians of the country called *Natches*, in Louisiana, laid a plot of massacring in one night every individual belonging to the French colony established there. This plot they actually executed, notwithstanding the seeming good understanding that subsisted between them and these European neighbours. Such was the secrecy which they observed, that no person had the least suspicion of their design until the blow was struck. One Frenchman alone escaped, by favour of the darkness, to relate the disaster of his countrymen. The compassion of a female Indian contributed also in some measure to his exemption from the general massacre. The tribe of *Natches* had invited the Indians of other countries, even to a considerable distance, to join in the same conspiracy. The day, or rather the night, was fixed, on which they were to make an united attack on the French colonists. It was intimated by sending a parcel of rods, more or less numerous according to the local distance of each tribe, with an injunction to abstract one rod daily; the day on which the last fell to be taken away being that fixed for the execution of their plan. The women were partners of the bloody secret. The parcels of rods being thus distributed, that belonging to the tribe of *Natches* happened to remain in the custody of a female. This woman, either moved by her own feelings of compassion, or by

the commiseration expressed by her female acquaintances in the view of the proposed scene of bloodshed, abstracted one day three or four of the rods, and thus anticipated the term of her tribe's proceeding to the execution of the general conspiracy. The consequence of this was, that the *Natches* were the only actors in this carnage; their distant associates having still several rods remaining at the time when the former made the attack. An opportunity was thereby given to the colonists in those quarters to take measures for their defence, and for preventing a more extensive execution of the design.

It was by conspiracies similar to this that the Indians of the province of Macas, in the kingdom of Quito, destroyed the opulent city of Logrogno, the colony of Guambaya, and its capital Sevilla del Oro; and that so completely, that it is no longer known in what place these settlements existed, or where that abundance of gold was found from which the last-mentioned city took the addition to its name. Like ravages have been committed upon *l'Imperiale* in Chili, the colonies of the Missions of Chuncas, those of Darien in Terra Firma, and many other places, which have afforded scenes of this barbarous ferocity. These conspiracies are always carried on in the same manner. The secret is inviolably kept, the actors assemble at the precise hour appointed, and every individual is animated with the same sanguinary purposes. The males that fall into their hands are put to death with every shocking circumstance that can be suggested by a cool and determined cruelty. The females are carried off, and preserved as monuments of their victory, to be employed as their occasions require.

Nor can this odious cruelty and treachery, it is said, be justly ascribed to their subjection to a foreign yoke, seeing the same character belongs equally to all the original inhabitants of this vast continent, even those who have preserved their independence most completely. Certain it is, continues he, that these people, with the most limited capacities for every thing else, display an astonishing degree of penetration and subtlety with respect to every object that involves treachery, bloodshed, and rapine. As to these, they seem to have been all educated at one school; and a secret, referring to any such plan, no consideration on earth can extort from them.

42
Their understandings also have been represented as Their understanding not less contemptible than their manners are gross and represented as weak. Many nations are neither capable of forming an arrangement for futurity; nor did their solicitude or foresight extend so far. They set no value upon those things of which they were not in some immediate want. In the evening, when a Carib is going to rest, no consideration will tempt him to sell his hammock; but in the morning he will part with it for the slightest trifle. At the close of winter, a North American, mindful of what he has suffered from the cold, sets himself with vigour to prepare materials for erecting a comfortable hut to protect him against the inclemency of the succeeding season: but as soon as the weather becomes mild, he abandons his work, and never thinks of it more till the return of the cold compels him to resume it.—In short, to be free from labour seems to be the utmost wish of an American. They will continue whole days stretched in their hammocks.

America. mocks, or seated on the earth, without changing their posture, raising their eyes, or uttering a single word. They cannot compute the succession of days nor of weeks. The different aspects of the moon alone engage

⁴³ Alleged in-
dolence and
stupidity. their attention as a measure of time. Of the year they have no other conception than what is suggested to them by the alternate heat of summer and cold of winter; nor have they the least idea of applying to this period the obvious computation of the months which it contains. When it is asked of any old man in Peru, even the most civilized, what age he is of? the only answer he can give is the number of caciques he has seen. It often happens, too, that they only recollect the most distant of these princes in whose time certain circumstances had happened peculiarly memorable, while of those that lived in a more recent period they have lost all remembrance.

The same gross stupidity is alleged to be observable in those Indians who have retained their original liberty. They are never known to fix the dates of any events in their minds, or to trace the succession of circumstances that have arisen from such events. Their imagination takes in only the present, and in that only what intimately concerns themselves. Nor can discipline or instruction overcome this natural defect of apprehension. In fact, the subjected Indians in Peru, who have a continual intercourse with the Spaniards, who are furnished with curates perpetually occupied in giving them lessons of religion and morality, and who mix with all ranks of the civilized society established among them, are almost as stupid and barbarous as their countrymen who have had no such advantages. The Peruvians, while they lived under the government of their Incas, preserved the records of certain remarkable events. They had also a kind of regular government, described by the historians of the conquest of Peru. This government originated entirely from the attention and abilities of their princes, and from the regulations enacted by them for directing the conduct of their subjects. This ancient degree of civilization among them gives ground to presume, that their legislatures sprung from some race more enlightened than the other tribes of Indians; a race of which no individual seems to remain in the present times.

⁴⁴ Their vanity and conceit.

Vanity and conceit are said to be blended with their ignorance and treachery. Notwithstanding all they suffer from Europeans, they still, it is said, consider themselves as a race of men far superior to their conquerors. This proud belief, arising from their perverted ideas of excellence, is universal over the whole known continent of America. They do not think it possible that any people can be so intelligent as themselves. When they are detected in any of their plots, it is their common observation, that the Spaniards, or *Viracochas*, want to be as knowing as they are. Those of Louisiana and the countries adjacent, are equally vain of their superior understanding, confounding that quality with the cunning which they themselves constantly practise. The whole object of their transactions is to over-reach those with whom they deal. Yet though faithless themselves, they never forgive the breach of promise on the part of others. While the Europeans seek their amity by presents, they give themselves no concern to secure a reciprocal friendship. Hence, probably, arises their idea, that they must be a superior

race of men, in ability and intelligence, to those who America are at such pains to court their alliance, and avert their enmity.

Their natural eloquence has also been decried. ⁴⁵ The Their elo-
free tribes of savages who enter into conventions with quence dis-
the Europeans, it is observed, are accustomed to make paraged.
long, pompous, and, according to their own notions, sublime harangues, but without any method or connection. The whole is a collection of disjointed metaphors and comparisons. The light, heat, and course of the sun, form the principal topic of their discourse; and these unintelligible reasonings are always accompanied with violent and ridiculous gestures. Numberless repetitions prolong the oration, which, if not interrupted, would last whole days: At the same time, they meditate very accurately before hand, in order to avoid mentioning any thing but what they are desirous to obtain. This pompous faculty of making speeches is also one of the grounds on which they conceive themselves to be superior to the nations of Europe: They imagine that it is their eloquence that procures them the favours they ask. The subjected Indians converse precisely in the same style. Prolix and tedious, they never know when to stop; so that, excepting by the difference in language, it would be impossible, in this respect, to distinguish a civilized Peruvian from an inhabitant of the most savage districts to the northward.

But such partial and detached views as the above, ⁴⁶ All these
were they even free from misrepresentation, are not the views par-
just ground upon which to form an estimate of their cha- tial, and not
racter. Their qualities, good and bad, (for they certainly free from
possess both), their way of life, the state of society a- misrepre-
mong them, with all the circumstances of their con- sentation.
dition, ought to be considered in connection, and in regard to their mutual influence. Such a view has been given in the preceding part of this article; from which, it is hoped, their real character may be easily deduced.

Many of the disagreeable traits exhibited in the anecdotes just quoted, are indeed extracted from Don Ulloa: an author of credit and reputation; but a Spaniard, and evidently biased in some degree by a desire to palliate the enormities of his countrymen in that quarter of the globe. And with regard to the worst and least equivocal parts of the American character, cruelty and revenge, it may be fairly questioned, whether the instances of these, either in respect of their cause or their atrocity, be at all comparable to those exhibited in European history, and staining the annals of Christendom:—to those, for instance, of the Spaniards themselves, at their first discovery of America; to those indicated by the engines found on board their mighty Armada; to those which, in cold blood, were perpetrated by the Dutch at Amboyna; to the dragoonings of the French; to their religious massacres; or even to the *tender mercies* of the Inquisition!

Still harsher, however, are the descriptions given by ⁴⁷ The physi-
Buffon and *de Paw* of the natives of this whole conti- cal descrip-
nent, in which the most mortifying degeneracy of the tionsof Buf-
human race, as well as of all the inferior animals, is son and de-
asserted to be conspicuous. Against those philoso- Paw refu-
phers, or rather theorists, the Americans have found ted.
an able advocate in the Abbé *Clavigero*; an historian *Hist. of*
whose *Mexico*,
v. II. p. 328.

America. whose situation and long residence in America afforded him the best means of information, and who, though himself a subject of Spain, appears superior to prejudice, and disdains in his description the glosses of policy.

Concerning the stature of the Americans, M. de Paw says, in general, that although it is not equal to the stature of the Castilians, there is but little difference between them. But the Abbé Clavigero evinces, that the Indians who inhabit those countries lying between 9 and 40 degrees of north latitude, which are the limits of the discoveries of the Spaniards, are more than five Parisian feet in height, and that those who do not reach that stature are as few in number amongst the Indians as they are amongst the Spaniards. It is besides certain, that many of those nations, as the *Apaches*, the *Hiaquese*, the *Pimese*, and *Cochimies*, are at least as tall as the tallest Europeans; and that, in all the vast extent of the New World, no race of people has been found, except the Esquimaux, so diminutive in stature as the Laplanders, the *Samojeds*, and Tartars, in the north of the Old continent. In this respect, therefore, the inhabitants of the two continents are upon an equality.

48
Stature,
shape, &c.

Of the shape and character of the Mexican Indians, the Abbé gives a most advantageous description; which he asserts no one who reads it in America will contradict, unless he views them with the eye of a prejudiced mind. It is true, that Ulloa says, in speaking of the Indians of Quito, he had observed, "that imperfect people abounded among them; that they were either irregularly diminutive, or monstrous in some other respect; that they became either insensible, dumb, or blind, or wanted some limb of their body." Having therefore made some inquiry respecting this singularity of the Quitans, the Abbé found, that such defects were neither caused by bad humours, nor by the climate, but by the mistaken and blind humanity of their parents, who, in order to free their children from the hardships and toils to which the healthy Indians are subjected by the Spaniards, fix some deformity or weakness upon them that they may become useless: a circumstance of misery which does not happen in other countries of America, nor in those places of the same kingdom of Quito, where the Indians are under no such oppression. M. de Paw, and in agreement with him Dr Robertson, says, that no deformed persons are to be found among the savages of America; because, like the ancient Lacedemonians, they put to death those children which are born hunch-backed, blind, or defective in any limb; but that in those countries where they are formed into societies, and the vigilance of their rulers prevent the murder of such infants, the number of their deformed individuals is greater than it is in any country of Europe. This would make an exceeding good solution of the difficulty, if it were true: but if, possibly, there has been in America a tribe of savages who have imitated the barbarous example of the celebrated Lacedemonians, it is certain that those authors have no grounds to impute such inhumanity to the rest of the Americans; for that it has not been the practice, at least with the far greater part of those nations, is to be demonstrated from the attestations of the authors the best acquainted with their customs.

Nº 14.

No argument against the New World can be drawn from the colour of the Americans: for their colour is less distant from the white of the Europeans than it is from the black of the Africans, and a great part of the Asiatics. The hair of the Mexicans, and of the greater part of the Indians, is, as we have already said, coarse and thick; on their face they appear to have little, and in general none on their arms and legs: but it is an error to say, as M. de Paw does, that they are entirely destitute of hair in all the other parts of their body. This is one of the many passages of the Philosophical Research-Errors concerning their want of beard, &c.
es, at which the Mexicans, and all the other nations, must smile to find an European philosopher so eager to divest them of the dress they had from nature. Don Ulloa, indeed, in the description which he gives of the Indians of Quito, says, that hair neither grows upon the men nor upon the women when they arrive at puberty, as it does on the rest of mankind; but whatever singularity may attend the Quitans, or occasion this circumstance, there is no doubt, that among the Americans in general, the period of puberty is accompanied with the same symptoms as it is among other nations of the world. In fact, with the North Americans, it is disgraceful to be hairy on the body. They say it likens them to hogs. They therefore pluck the hair as fast as it appears. But the traders who marry their women, and prevail on them to discontinue this practice, say, that nature is the same with them as with the whites. As to the beards of the men, had Buffon or de Paw known the pains and trouble it costs them to pluck out by the roots the hair that grows on their faces, they would have seen that nature had not been deficient in that respect. Every nation has its customs. "I have seen an Indian beau, with a looking-glass in his hand, (says Mr Jefferson), examining his face for hours together, and plucking out by the roots every hair he could discover, with a kind of tweezer made of a piece of fine brass wire, that had been twisted round a stick, and which he used with great dexterity."

50
The very aspect of an Angolan, Mandingan, or Con-Their form and aspect contrasted with those of some other nations.
gan, would have shocked M. de Paw, and made him recall that censure which he passes on the colour, the make, and hair of the Americans. What can be imagined more contrary to the idea we have of beauty, and the perfection of the human frame, than a man whose body emits a rank smell, whose skin is as black as ink, whose head and face are covered with black wool instead of hair, whose eyes are yellow and bloody, whose lips are thick and blackish, and whose nose is flat? Such are the inhabitants of a very large portion of Africa, and of many islands of Asia. What men can be more imperfect than those who measure no more than four feet in stature, whose faces are long and flat, the nose compressed, the irides yellowish black, the eye-lids turned back towards the temples, the cheeks extraordinarily elevated, their mouths monstrously large, their lips thick and prominent, and the lower part of their visages extremely narrow? Such, according to Count de Buffon, are the Laplanders, the Zemblans, the Borandines, the Samojeds, and Tartars in the East. What objects more deformed than men whose faces are too long and wrinkled even in their youth, their noses thick and compressed, their eyes small and sunk, their cheeks very much raised, the upper jaw low, their teeth long

America. long and disunited, eye-brows so thick that they shade their eyes; the eye-lids thick, some bristles on their faces instead of beard, large thighs and small legs? Such is the picture Count de Buffon gives of the Tartars; that is, of those people who, as he says, inhabit a tract of land in Asia 1200 leagues long and upwards, and more than 750 broad. Amongst these the Calmucks are the most remarkable for their deformity; which is so great, that, according to Tavernier, they are the most brutal men of all the universe. Their faces are so broad that there is a space of five or six inches between their eyes, according as Count de Buffon himself affirms. In Calicut, in Ceylon, and other countries of India, there is, say Pyrrard and other writers on those regions, a race of men who have one or both of their legs as thick as the body of a man; and that this deformity among them is almost hereditary. The Hottentots, besides other gross imperfections, have that monstrous irregularity attending them, of a callos appendage extending from the os pupis downwards, according to the testimony of the historians of the Cape of Good Hope. Struys, Gemelli, and other travellers affirm, that in the kingdom of Lambry, in the islands of Formosa, and of Mindoro, men have been found with tails. Bomare says, that a thing of this kind in men is nothing else than an elongation of the os coccygis; but what is a tail in quadrupeds but the elongation of that bone, though divided into distinct articulations? However it may be, it is certain, that that elongation renders those Asiatics fully as irregular as if it was a real tail.

If we were, in like manner, to go through the nations of Asia and Africa, we should hardly find any extensive country where the colour of men is not darker, where there are not stronger irregularities observed, and grosser defects to be found in them, than M. de Paw finds fault with in the Americans. The colour of the latter is a good deal clearer than that of almost all the Africans and the inhabitants of southern Asia. Even their alledged scantiness of beard is common to the inhabitants of the Philippine Islands, and of all the Indian Archipelago, to the famous Chinese, Japanese, Tartars, and many other nations of the Old continent. The imperfections of the Americans, however great they may be represented to be, are certainly not comparable with the defects of that immense people, whose character we have sketched, and others whom we omit.

⁵¹ Their constitution and corporeal abilities. M. de Paw represents the Americans to be a feeble and diseased set of nations; and, in order to demonstrate the weakness and disorder of their physical constitution, adduces several proofs equally ridiculous and ill founded, and which it will not be expected we should enumerate. He alledges, among other particulars, that they were overcome in wrestling by all the Europeans, and that they sunk under a moderate burden; that by a computation made, 200,000 Americans were found to have perished in one year from carrying of baggage. With respect to the first point, the Abbé Clavigero observes, it would be necessary that the experiment of wrestling was made between many individuals of each continent, and that the victory should be attested by the Americans as well as the Europeans. It is not, however, meant to insist, that the Americans are stronger than the Europeans. They may be less strong, without the human species having degenerated in them. The Swiss are

VOL. I. Part II.

America. stronger than the Italians; and still we do not believe the Italians are degenerated, nor do we tax the climate of Italy. The instance of 200,000 Americans having died in one year, under the weight of baggage, were it true, would not convince us so much of the weakness of the Americans, as of the inhumanity of the Europeans. In the same manner that those 200,000 Americans perished, 200,000 Prussians would also have perished, had they been obliged to make a journey of between 300 and 400 miles, with 100 pounds of burden upon their backs; if they had collars of iron about their necks, and were obliged to carry that load over rocks and mountains; if those who became exhausted with fatigue, or wounded their feet so as to impede their progress, had their heads cut off that they might not retard the pace of the rest; and if they were not allowed but a small morsel of bread to enable them to support so severe a toil. Les Cafas, from whom M. de Paw got the account of the 200,000 Americans who died under the fatigue of carrying baggage, relates also all the above mentioned circumstances. If that author therefore is to be credited in the last, he is also to be credited in the first. But a philosopher who vaunts the physical and moral qualities of Europeans over those of the Americans, would have done better, we think, to have suppressed facts so opprobrious to the Europeans themselves.

Nothing in fact demonstrates so clearly the robustness of the Americans as those various and lasting ⁵² Their labours and industry. tiges in which they are continually engaged. M. de Paw says, that when the New World was discovered, nothing was to be seen but thick woods; that at present there are some lands cultivated, not by the Americans, however, but by the Africans and Europeans; and that the soil in cultivation is to the soil which is uncultivated as 2000 to 2,000,000. These three assertions the Abbé demonstrates to be precisely as many errors. Since the conquest, the Americans alone have been the people who have supported all the fatigues of agriculture in all the vast countries of the continent of South America, and in the greater part of those of South America subject to the crown of Spain. No European is ever to be seen employed in the labours of the field. The Moors who, in comparison of the Americans, are very few in number in the kingdom of New Spain, are charged with the culture of the sugar-cane and tobacco, and the making of sugar; but the soil destined for the cultivation of those plants is not with respect to all the cultivated land of that country in the proportion of one to two thousand. The Americans are the people who labour on the soil. They are the tillers, the sowers, the weeders, and the reapers of the wheat, of the maize, of the rice, of the beans, and other kinds of grain and pulse, of the cacao, of the vanilla, of the cotton, of the indigo, and all other plants useful to the sustenance, the clothing, and commerce of those provinces; and without them so little can be done, that in the year 1762, the harvest of wheat was abandoned in many places on account of a sickness which prevailed and prevented the Indians from reaping it. But this is not all; the Americans are they who cut and transport all the necessary timber from the woods; who cut, transport, and work the stones; who make lime, plaster, and tiles; who construct all the buildings of that kingdom, except a few places

America. places where none of them inhabit; who open and repair all the roads, who make the canals and sluices, and clean the cities. They work in many mines of gold, of silver, of copper, &c. they are the shepherds, herdsmen, weavers, potters, basket-makers, bakers, couriers, day-labourers, &c.; in a word, they are the persons who bear all the burden of public labours. These, says our justly indignant author, are the employments of the weak, dastardly, and useless Americans; while the vigorous M. de Paw, and other indefatigable Europeans, are occupied in writing invectives against them.

53
These a sufficient proof of their healthiness & strength.

These labours, in which the Indians are continually employed, certainly attest their healthiness and strength; for if they are able to undergo such fatigues, they cannot be diseased, nor have an exhausted stream of blood in their veins, as M. de Paw insinuates. In order to make it believed that their constitutions are vitiated, he copies whatever he finds written by historians of America, whether true or false, respecting the diseases which reign in some particular countries of that great continent. It is not to be denied, that in some countries in the wide compass of America, men are exposed more than elsewhere to the distempers which are occasioned by the intemperance of the air, or the pernicious quality of the aliments; but it is certain, according to the assertion of many respectable authors acquainted with the New World, that the American countries are, for the most part, healthy; and if the Americans were disposed to retaliate on M. de Paw, and other European authors who write as he does, they would have abundant subject of materials to throw discredit on the clime of the Old continent, and the constitution of its inhabitants in the endemic distempers which prevail there.

Lastly, The supposed feebleness and unsound bodily habit of the Americans do not correspond with the length of their lives. Among those Americans whose great fatigues and excessive toils do not anticipate their death, there are not a few who reach the age of 80, 90, and 100 or more years, as formerly mentioned; and what is more, without there being observed in them that decay which time commonly produces in the hair, in the teeth, in the skin, and in the muscles of the human body. This phenomenon, so much admired by the Spaniards who reside in Mexico, cannot be ascribed to any other cause than the vigour of their constitutions, the temperance of their diet, and the salubrity of their clime. Historians, and other persons who have sojourned there for many years, report the same thing of other countries of the New World.

54
Their mental qualities.

As to the mental qualities of the Americans M. de Paw has not been able to discover any other characters than a memory so feeble, that to day they do not remember what they did yesterday; a capacity so blunt, that they are incapable of thinking, or putting their ideas in order; a disposition so cold, that they feel no excitement of love; a dastardly spirit, and a genius that is torpid and indolent. Many other Europeans, indeed, and what is still more wonderful, many of those children or descendants of Europeans who are born in America, think as M. de Paw does; some from ignorance, some from want of reflection, and others from hereditary prejudice and prepossession. But all this and more would not be sufficient to invalidate the testimonies of other Europeans, whose authority have a

great deal more weight, both because they were men of great judgement, learning, and knowledge of these countries, and because they gave their testimony in favour of strangers against their own countrymen. In particular, Acofta, whose natural and moral history even de Paw commends as *an excellent work*, employs the whole sixth book in demonstrating the good sense of the Americans by an explanation of their ancient government, their laws, their histories in paintings and knots, calendars, &c. M. de Paw thinks the Americans are bestial; Acofta, on the other hand, reputes those persons weak and presumptuous who think them so. M. de Paw says, that the most acute Americans were inferior in industry and sagacity to the rudest nations of the Old continent; Acofta extols the civil government of the Mexicans above many republics of Europe. M. de Paw finds, in the moral and political conduct of the Americans, nothing but barbarity, extravagance, and brutality; and Acofta finds there, laws that are admirable and worthy of being preserved for ever.

M. de Paw denies them courage, and alledges the conquest of Mexico as a proof of their cowardice. 55
“Cortes (he says), conquered the empire of Mexico with 450 vagabonds and 15 horses, badly armed; his miserable artillery consisted of six falconets, which would not at the present day be capable of exciting the fears of a fortress defended by invalids. During his absence the capital was held in awe by the half of his troops. What men! what events!—It is confirmed by the depositions of all historians, that the Spaniards entered the first time into Mexico without making one single discharge of their artillery. If the title of hero is applicable to him who has the disgrace to occasion the death of a great number of rational animals, Ferdinand Cortes might pretend to it; otherwise I do not see what true glory he has acquired by the overthrow of a tottering monarchy, which might have been destroyed in the same manner by any other assassin of our continent.” 56
These passages indicate either M. de Paw’s ignorance of the history of the conquest of Mexico, or a wilful suppression of what would openly contradict his system; since all who have read that history know well, that the conquest of Mexico was not made with 450 men, but with more than 200,000. Cortes himself, to whom it was of more importance than to M. de Paw to make his bravery conspicuous, and his conquest appear glorious, confesses the excessive number of the allies who were under his command at the siege of the capital, and combated with more fury against the Mexicans than the Spaniards themselves. According to the account which Cortes gave to the emperor Charles V. the siege of Mexico began with 87 horses, 848 Spanish infantry, armed with guns, cross-bows, swords, and lances, and upwards of 75,000 allies, of Tlascala, Huexotzinco, Cholula, and Chalco, equipped with various sorts of arms; with three large pieces of cannon of iron, 15 small of copper, and 13 brigantines. In the course of the siege were assembled the numerous nations of the Otomies, the Coahuixcas, and Matlazincas, and the troops of the populous cities of the lakes; so that the army of the besiegers not only exceeded 200,000, but amounted to 4,000,000, according to the letter from Cortes; and besides these, 3000 boats and canoes came to their assistance. Did it betray cowardice to have sustained,

America. stained, for full 75 days, the siege of an open city, engaging daily with an army so large, and in part provided with arms so superior, and at the same time having to withstand the ravages of famine? Can they merit the charge of cowardice, who, after having lost seven of the eight parts of their city, and about 50,000 citizens, part cut off by the sword, part by famine and sickness, continued to defend themselves until they were furiously assaulted in the last hold which was left them? See the article MEXICO.

57

Remark-
able in-
stance of ca-
lunmy in
M. de Paw.

According to M. de Paw, "the Americans at first were not believed to be men, but rather satyrs, or large apes, which might be murdered without remorse or reproach. At last, in order to add insult to the oppression of those times, a pope made an original bull, in which he declared, that being desirous of founding bishoprics in the richest countries of America, it pleased him and the Holy Spirit, to acknowledge the Americans to be true men: in so far, that without this decision of an Italian, the inhabitants of the New World would have appeared, even at this day, to the eyes of the faithful, a race of equivocal men. There is no example of such a decision since this globe has been inhabited by men and apes." Upon this passage the Abbé animadverts, as being a singular instance of calumny and misrepresentation; and gives the following history of the decision alluded to.

58

Occasion of
the famous
bull of Paul
III.

"Some of the first Europeans who established themselves in America, not less powerful than avaricious, desirous of enriching themselves to the detriment of the Americans, kept them continually employed, and made use of them as slaves; and in order to avoid the reproaches which were made them by the bishops and missionaries who inculcated humanity, and the giving liberty to those people to get themselves instructed in religion, that they might do their duties towards the church and their families, alledged, that the Indians were by nature slaves and incapable of being instructed; and many other falsehoods of which the Chronicler Herrera makes mention against them. Those zealous ecclesiastics being unable, either by their authority or preach-

America. ing, to free those unhappy converts from the tyranny of such misers, had recourse to the Catholic kings, and at last obtained from their justice and clemency, those laws as favourable to the Americans as honourable to the court of Spain, that compose the Indian code, which were chiefly due to the indefatigable zeal of the bishop de las Casas. On another side, Garces, bishop of Tlascala, knowing that those Spaniards bore, notwithstanding their perversity, a great respect to the decisions of the vicar of Jesus Christ, made application in the year 1586 to pope Paul III. by that famous letter, of which we have made mention; representing to him the evils which the Indians suffered from the wicked Christians, and praying him to interpose his authority in their behalf. The pope, moved by such heavy remonstrances, dispatched the next year the original bull, a faithful copy of which we have here subjoined (A), which was not made, as is manifest, to declare the Americans true men; for such a piece of weakness was very distant from that or any other pope: but solely to support the natural rights of the Americans against the attempts of their oppressors, and to condemn the injustice and inhumanity of those, who, under the pretence of supposing those people idolatrous, or incapable of being instructed, took from them their property and their liberty, and treated them as slaves and beasts.

59

Representa-
tion of
Columbus.

If at first the Americans were esteemed satyrs, nobody can better prove it than Christopher Columbus their discoverer. Let us hear, therefore, how that celebrated admiral speaks, in his account to the Catholic kings Ferdinand and Isabella, of the first satyrs he saw in the island of Haiti, or Hispaniola. "I swear," he says, "to your majesties, that there is not a better people in the world than these, more affectionate, affable, or mild. They love their neighbours as themselves; their language is the sweetest, the softest, and the most cheerful; for they always speak smiling; and although they go naked, let your majesties believe me, their customs are very becoming; and their king, who is served with great majesty, has such engaging manners, that it gives great pleasure to see him, and also to consider

4 A 2

the

(A) Paulus papa III. universis Christi Fidelibus presentes Litteras inspecturis Salutem & Apostolicam Benedictionem—"Veritas ipsa, quæ nec falli, nec fallere potest, cum Prædicatores Fidei ad officium prædicationis destinaret, dixisse dignoscitur: *Euntes docete omnes gentes*: omnes, dixit, absque omni delectu, cum omnes Fidei disciplina capaces existant. Quod videns & invidens ipsius humani generis æmulus, qui bonis operibus, ut pereant, semper adversatur, modum excogitavit hætenus inauditum, quo impediret, ne Verbum Dei Gentibus, ut salvæ fierent, prædicaretur: ut quosdam suos satellites commovit, qui suam cupiditatem adimplere cupientes, Occidentales & Meridionales Indos, et alias gentes, quæ temporibus istis ad nostram notitiam pervenerunt, sub prætextu quod Fidei Catholicæ expertes existant, uti bruta animalia, ad nostra obsequia redigendos esse, passim asserere præsumant, et eos in servitutem redigunt, tantis afflictionibus illos urgentes, quantis vix bruta animalia illis servientia urgeant. Nos igitur, qui ejusdem Domini nostri vices, licet indigni, gerimus in terris, & Oves gregis sui nobis commissas, quæ extra ejus Ovile sunt, ad ipsum Ovile toto nixu exquirimus, attendentes Indos ipsos, utpote veros homines, non solum Christianæ Fidei capaces existere, sed, ut nobis innotuit, ad Fidem ipsam promptissime currere, ac volentes super his congruis remediis providere, prædictos Indos & omnes alias gentes ad notitiam Christianorum in posterum deveniunt, licet extra fidem Christi existant, sua libertate & dominio hujusmodi uti, & potiri, & gaudere libere & licite posse, nec in servitutem redigi debere, ac quicquid secus fieri contigerit irritum & inane, ipsosque Indos, & alias Gentes Verbi Dei prædicatione, & exemplo bonæ vitæ ad dictam Fidem Christi invitandos fore. Auctoritate Apostolica per præsentis literas decernimus, & declaramus, non obstantibus præmissis, cæterisque contrariis quibuscunque." Datum Romæ anno 1537. IV. Non. Jun. Pontificatus nostri anno III. Quæsta, è non altra è quella famosa bolla, per la quale s'è fatto un sì grande schiamazzo.

America. the great retentive faculty of that people, and their desire of knowledge, which incites them to ask the causes and the effects of things."

60
Conclusions
concerning
the capaci-
ties of the
Americans.

"We have had intimate commerce with the Americans, (continues the Abbé); have lived for some years in a seminary destined for their instruction; saw the erection and progress of the royal college of Guadalupe, founded in Mexico, by a Mexican Jesuit, for the education of Indian children; had afterwards some Indians amongst our pupils; had particular knowledge of many American rectors, many nobles, and numerous artists; attentively observed their character, their genius, their disposition, and manner of thinking; and have examined besides, with the utmost diligence, their ancient history, their religion, their government, their laws, and their customs. After such long experience and study of them, from which we imagine ourselves enabled to decide without danger of erring, we declare to M. de Paw, and to all Europe, that the mental qualities of the Americans are not in the least inferior to those of the Europeans; that they are capable of all, even the most abstract sciences; and that if equal care was taken of their education, if they were brought up from childhood in seminaries under good masters, were protected and stimulated by rewards, we should see rise among the Americans, philosophers, mathematicians, and divines, who would rival the first in Europe."

61
Their inge-
nuity, &c.
asserted.

But although we should suppose, that, in the torrid climates of the New World, as well as in those of the Old, especially under the additional depression of slavery, there was an inferiority of the mental powers, the Chilese and the North-Americans have discovered higher rudiments of human excellence and ingenuity than have ever been known among tribes in a similar state of society in any part of the world.

M. de Paw affirms, that the Americans were unacquainted with the use of money, and quotes the following well-known passage from Montesquieu: "Imagine to yourself, that, by some accident, you are placed in an unknown country; if you find money there, do not doubt that you are arrived among a polished people." But if by money we are to understand a piece of metal with the stamp of the prince or the public, the want of it in a nation is no token of barbarity. The Athenians employed oxen for money, as the Romans did sheep. The Romans had no coined money till the time of Servius Tullius, nor the Persians until the reign of Darius Hystaspes. But if by money is understood a sign representing the value of merchandise, the Mexicans, and other nations of Anahuac, employed money in their commerce. The cacao, of which they made constant use in the market to purchase whatever they wanted, was employed for this purpose, as salt is in Abyssinia.

It has been affirmed, that stone bridges were unknown in America when it was first discovered; and that the natives did not know how to form arches. But these assertions are erroneous. The remains of the ancient palaces of Tezcuco, and still more their vapour-baths, show the ancient use of arches and vaults among the Mexicans. But the ignorance of this art would have been no proof of barbarity. Neither the Egyptians nor Babylonians understood the construction of arches.

M. de Paw affirms, that the palace of Montezuma was nothing else than a hut. But it is certain, from

the affirmation of all the historians of Mexico, that the American army under Cortes, consisting of 6,400 men, were all lodged in the palace; and there remained still sufficient room for Montezuma and his attendants.

62
The advances which the Mexicans had made in the Tokens of study of astronomy is perhaps the most surprising proof science. of their attention and sagacity; for it appears from Abbé Clavigero's history, that they not only counted 365 days to the year, but also knew of the excess of about six hours in the solar over the civil year, and remedied the difference by means of intercalary days. See ASTRONOMY, n° 5.

63
Of American morality, the following exhortation of Specimen a Mexican to his son may serve as a specimen. "My of their mo- son, who art come into the light from the womb of thy rality. mother like a chicken from the egg, and like it art preparing to fly through the world, we know not how long Heaven will grant to us the enjoyment of that precious gem which we possess in thee; but however short the period, endeavour to live exactly, praying God continually to assist thee. He created thee: thou art his property. He is thy father, and loves thee still more than I do; repose in him thy thoughts, and day and night direct thy sighs to him. Reverence and salute thy elders, and hold no one in contempt. To the poor and distressed be not dumb, but rather use words of comfort. Honour all persons, particularly thy parents, to whom thou owest obedience, respect, and service. Guard against imitating the example of those wicked sons, who, like brutes that are deprived of reason, neither reverence their parents, listen to their instruction, nor submit to their correction; because whoever follows their steps will have an unhappy end, will die in a desperate or sudden manner, or will be killed and devoured by wild beasts.

"Mock not, my son, the aged or the imperfect. Scorn not him whom you see fall into some folly or transgression, nor make him reproaches; but restrain thyself, and beware lest thou fall into the same error which offends thee in another. Go not where thou art not called, nor interfere in that which does not concern thee. Endeavour to manifest thy good-breeding in all thy words and actions. In conversation, do not lay thy hands upon another, nor speak too much, nor interrupt or disturb another's discourse. When any one discourses with thee, hear him attentively, and hold thyself in an easy attitude, neither playing with thy feet, nor putting thy mantle to thy mouth, nor spitting too often, nor looking about you here and there, nor rising up frequently, if thou art sitting; for such actions are indications of levity and low-breeding."—He proceeds to mention several particular vices which are to be avoided, and concludes,— "Steal not, nor give thyself to gaming; otherwise thou wilt be a disgrace to thy parents, whom thou oughtest rather to honour for the education they have given thee. If thou wilt be virtuous, thy example will put the wicked to shame. No more, my son; enough hath been said in discharge of the duties of a father. With these counsels I wish to fortify thy mind. Refuse them not, nor act in contradiction to them; for on them thy life and all thy happiness depend."

As ranging on the same side with the Abbé Clavigero, the ingenious Mr Jefferson deserves particular attention.

64 America. attention. This gentleman, in his Notes on the State of Virginia, &c. has taken occasion to combat the opinions of Buffon; and seems to have fully refuted them both by argument and facts. The French philosopher asserts, "That living nature is less active, less energetic, in the New World than in the Old." He affirms, 1. That the animals common to both continents are smaller in America. 2. That those peculiar to the New are on an inferior scale. 3. That those which have been domesticated in both have degenerated in America; and, 4. That it exhibits fewer species of living creatures. The cause of this he ascribes to the diminution of heat in America, and to the prevalence of humidity from the extension of its lakes and waters over a prodigious surface. In other words, he affirms that *heat* is friendly, and *moisture* adverse, to the production and development of the larger quadrupeds.

65 The hypothesis, that moisture is unfriendly to animal growth, Mr Jefferson shows to be contradicted by observation and experience. It is by the assistance of heat and moisture that vegetables are elaborated from the elements. Accordingly we find that the more humid climates produce plants in greater profusion than the dry. Vegetables are immediately or remotely the food of every animal; and, from the uniform operation of Nature's laws we discern, that, in proportion to the quantity of food, animals are not only multiplied in their numbers, but improved in their size. Of this last opinion is the Count de Buffon himself, in another part of his work: "En general, il paroît que les pays un peu froids conviennent mieux à nos bœufs que les pays chauds, et qu'ils sont d'autant plus gros et plus grands que le climat est plus *humide* et plus abondans en paturages. Les bœufs de Danemarck, de la Podolie, de l'Ukraine, et de la Tartarie qu'habitent les Calmouques, sont les plus grands de tous." Here, then, a race of animals, and one of the largest too, has been increased in its dimensions by cold and moisture, in direct opposition to the hypothesis, which supposes that these two circumstances diminish animal bulk, and that it is their contraries, heat and dryness, which enlarge it. But to try the question on more general ground, let us take two portions of the earth, Europe and America for instance, sufficiently extensive to give operation to general causes; let us consider the circumstances peculiar to each, and observe their effect on animal nature. America, running through the torrid as well as temperate zone, has more heat, collectively taken, than Europe. But Europe, according to our hypothesis, is the driest. They are equally adapted then to animal productions; each being endowed with one of those causes which befriend animal growth, and with one which opposes it. Let us, then, take a comparative view of the quadrupeds of Europe and America, presenting them to the eye in three different tables; in one of which shall be enumerated those found in both countries; in a second, those found in one only; in a third, those which have been domesticated in both. To facilitate the comparison, let those of each table be arranged in gradation, according to their sizes, from the greatest to the smallest, so far as their sizes can be conjectured. The weights of the large animals shall be expressed in the English avoirdupoise pound and its decimals; those of the smaller in the ounce and its decimals. Those which are marked thus *, are actual weights of particular subjects, deemed among the largest of their species. Those marked thus †, are furnished by judicious persons, well acquainted with the species, and saying, from conjecture only, what the largest individual they had seen would probably have weighed. The other weights are taken from Messrs Buffon and D'Aubenton, and are of such subjects as came casually to their hands for dissection.

ed thus *, are actual weights of particular subjects, deemed among the largest of their species. Those marked thus †, are furnished by judicious persons, well acquainted with the species, and saying, from conjecture only, what the largest individual they had seen would probably have weighed. The other weights are taken from Messrs Buffon and D'Aubenton, and are of such subjects as came casually to their hands for dissection.

"Comparative View of the Quadrupeds of Europe and of America.

TABLE I. *Aboriginals of both.*

	Europe.	America.
	lb.	lb.
Mammoth		
Buffalo. Bison		*1800
White bear. Ours blanc		
Caribou. Renne		
Bear. Ours	153.7	*410
Elk. Elan. Original, palmated		*273
Red deer. Cerf	288.8	
Fallow deer. Daim	167.8	
Wolf. Loup	69.8	
Roe. Chevreuil	55.7	
Glutton. Glouton. Carcajou		
Wild cat. Chat sauvage		†30
Lynx. Loup cervier	25.	
Beaver. Castor	18.5	*45
Badger. Blaireau	13.6	
Red fox. Renard	13.5	
Grey fox. Ifatis		
Otter. Loutre	8.9	†12
Monax. Marmotte	6.5	
Vison. Fouine	2.8	
Hedgehog. Herisson	2.2	
Martin. Marte	1.9	†6
	oz.	
Water rat. Rat d'eau	7.5	
Wesel. Belette	2.2	oz.
Flying squirrel. Polatouche	2.2	†4
Shrew mouse. Musaraigne	1.	

TABLE II. *Aboriginals of one only.*

EUROPE.		AMERICA.	
	lb.		lb.
Sanglier. Wild boar	280.	Tapir	534.
Mouflon. Wild sheep	56.	Elk, round horned	†450.
Bouquetin. Wild goat		Puma	
Lievre. Hare	7.6	Jaguar	218.
Lapin. Rabbit	3.4	Cabiai	109.
Putois. Polecat	3.3	Tamanoir	109.
Genette	3.1	Tamandua	65.4
Desman. Muskrat	oz.	Cougar of N. Amer.	75.
Ecureuil. Squirrel	12.	Cougar of S. Amer.	59.4
Hermine. Ermin.	8.2	Ocelot	
Rat. Rat	7.5	Pecari	46.3
Loirs	3.1	Jaguaret	43.6
Lerot. Dormouse	1.8	Alco	
Taupe. Mole	1.2	Lama	
Hamster	.9	Paco	
Zifel		Paca	32.7
Leming		Serval	
Souris. Mouse	.6	Sloth. Unau.	27.4

America.

Table II. continued.

EUROPE.

AMERICA.

	lb.
Saricovienne	
Kincajou	
Tatou Kabaffou	21.8
Urfon. Urchin	
Raccoon. Raton	16.5
Coati	
Coendou	16.3
Sloth. Ai	13.
Sapajou Ouarini	
Sapajou Coaita	9.8
Tatou Encubert	
Tatou Apar	
Tatou Cachica	7.
Little Coendou	6.5
Opoffum. Sarigue	
Tapeti	
Margay	
Crabier	
Agouti	4.2
Sapajou Sai	3.5
Tatou Cirquinçon	
Tatou Tatouate	3.3
Mouffette Squash	
Mouffette Chinche	
Mouffette Conepate.	
Scunk	
Mouffette. Zorilla	
Whabus. Hare. Rab-	
bit	
Aperea	
Akouchi	
Ondatra. Muskrat	
Pilori	
Great grey squirrel	† 2.7
Fox squirrel of Vir-	
ginia	† 2.625
Surikate	2.
Mink.	† 2.
Sapajou. Sajou	1.8
Indian pig. Cochon	
d'Inde	1.6
Sapajou. Saïmiri	1.5
Phalanger	
Coquallin	
Lesser grey squirrel	† 1.5
Black squirrel	† 1.5
Red squirrel	10. oz.
Sagoin Saki	
Sagoin Pinche	
Sagoin Tamarin	oz.
Sagoin Ouistiti	4.4
Sagoin Marikine	
Sagoin Mico	
Cayopollin	
Fourmillier	
Marmose	
Sarigue of Cayenne	
Tucan	
Red mole	oz.
Ground squirrel	4.

TABLE III. Domesticated in both.

Europe.

America.

	lb.	lb.
Cow	763.	*2500
Horse		*1366
Ass		
Hog		*1200
Sheep		*125
Goat		*80
Dog	67.6	
Cat	7.	

"The result of this view is, that of 26 quadrupeds common to both countries, seven are said to be larger the first in America, seven of equal size, and 12 not sufficient-ly examined. So that the first table impeaches the first member of the assertion, that of the animals common to both countries the American are smallest, "Et cela sans aucune exception." It shows it not just, in all the latitude in which its author has advanced it, and probably not to such a degree as to found a distinction between the two countries.

"Proceeding to the second table, which arranges the animals found in one of the two countries only, M. de Buffon observes, that the taphir, the elephant of America, is but of the size of a small cow. To pre-serve our comparison, Mr Jefferson states the wild boar, the elephant of Europe, as little more than half that size. He has made an elk with round or cylindrical horns, an animal of America, and peculiar to it; because he has seen many of them himself, and more of their horns; and because, from the best information, it is certain that in Virginia this kind of elk has abounded much, and still exists in smaller numbers. He makes the American hare or rabbit peculiar, believing it to be different from both the European animals of those denominations, and calling it therefore by its Algonquin name Whabus, to keep it distinct from these. Kalm is of the same opinion. The squirrels are denominated from a knowledge derived from daily sight of them, because with that the European appellations and descriptions seem irreconcilable. These are the only instances in which Mr Jefferson departs from the authority of M. de Buffon in the construction of this table; whom he takes for his ground-work, because he thinks him the best informed of any naturalist who has ever written. The result is, that there are 18 quadrupeds peculiar to Europe; more than four times as many, to wit 74, peculiar to America; that the first of these 74, the tapir, the largest of the animals peculiar to America, weighs more than the whole column of Europeans; and consequently this second table disproves the second member of the assertion, that the animals peculiar to the New World are on a smaller scale, so far as that assertion relied on European animals for support: and it is in full opposition to the theory which makes the animal volume to depend on the circumstances of heat and moisture.

"The third table comprehends those quadrupeds only which are domestic in both countries. That some of these, in some parts of America, have become less than their original stock, is doubtless true; and the reason is very obvious. In a thinly peopled country, the

America.

67

68

Explanation and result of the second table.

69

Of the third table.

America. the spontaneous productions of the forests and waste fields are sufficient to support indifferently the domestic animals of the farmer, with a very little aid from him in the severest and scarcest season. He therefore finds it more convenient to receive them from the hand of Nature in that indifferent state, than to keep up their size by a care and nourishment which would cost him much labour. If, on this low fare, these animals dwindle, it is no more than they do in those parts of Europe where the poverty of the soil, or poverty of the owner, reduces them to the same scanty subsistence. It is the uniform effect of one and the same cause, whether acting on this or that side of the globe. It would be erring, therefore, against that rule of philosophy, which teaches us to ascribe like effects to like causes, should we impute this diminution of size in America to any imbecillity or want of uniformity in the operations of nature. It may be affirmed with truth, that in those countries, and with those individuals of America, where necessity or curiosity has produced equal attention as in Europe to the nourishment of animals, the horses, cattle, sheep, and hogs of the one continent are as large as those of the other. There are particular instances, well attested, where individuals of America have imported good breeders from England, and have improved their size by care in the course of some years. And the weights actually known and stated in the third table, will suffice to show, that we may conclude, on probable grounds, that, with equal food and care, the climate of America will preserve the races of domestic animals as large as the European stock from which they are derived; and consequently that the third member of Monf. de Buffon's assertion, that the domestic animals are subject to degeneration from the climate of America, is as probably wrong as the first and second were certainly so.

That the last part of it is erroneous, which affirms, that the species of American quadrupeds are comparatively few, is evident from the tables taken all together; to which may be added the proof adduced by the Abbé Clavigero. According to Buffon's latest calculation, in his *Epoques de la Nature*, there are 300 species of quadrupeds; and America, though it does not make more than a third part of the globe, contains, according to Clavigero, almost one half of the different species of its animals.

70 The human inhabitants of America, to whom the same hypothesis of degeneracy is extended, M. Buffon gives the following description: "Though the American savage be nearly of the same stature with men in polished societies; yet this is not a sufficient exception to the general contraction of animated Nature throughout the whole continent. In the savage, the organs of generation are small and feeble. He has no hair, no beard, no ardour for the female. Tho' nimbler than the European, because more accustomed to running, his strength is not so great. His sensations are less acute; and yet he is more timid and cowardly. He has no vivacity, no activity of mind. The activity of his body is not so much an exercise or spontaneous motion, as a necessary action produced by want. Destroy his appetite for victuals and drink, and you will at once annihilate the active principle of all his movements: He remains in stupid repose, on his limbs or couch, for whole days. It is easy to discover the cause of the

scattered life of savages, and of their estrangement from society. They have been refused the most precious spark of Nature's fire: They have no ardour for women, and, of course, no love to mankind. Unacquainted with the most lively and most tender of all attachments, their other sensations of this nature are cold and languid. Their love to parents and children is extremely weak. The bonds of the most intimate of all societies, that of the same family, are feeble; and one family has no attachment to another. Hence no union, no republic, no social state, can take place among them. The physical cause of love gives rise to the morality of their manners. Their heart is frozen, their society cold, and their empire cruel. They regard their females as servants destined to labour, or as beasts of burden, whom they load unmercifully with the produce of their hunting, and oblige, without pity or gratitude, to perform labours which often exceed their strength. They have few children, and pay little attention to them. Every thing must be referred to the first cause: They are indifferent, because they are weak; and this indifference to the sex is the original stain which disgraces Nature, prevents her from expanding, and, by destroying the germs of life, cuts the root of society. Hence man makes no exception to what has been advanced. Nature, by denying him the faculty of love, has abused and contracted him more than any other animal."

A humiliating picture indeed! but than which, Mr. Observa-
Jefferson assures us, never was one more unlike the o-
riginal. M. Buffon grants, that their stature is the Jefferson.
same as that of the men of Europe; and he might have admitted, that the Iroquois were larger, and the Lenopi or Delawares taller, than people in Europe generally are: But he says their organs of generation are smaller and weaker than those of Europeans; which is not a fact. And as to their want of beard, this error has been already noticed, (n^o 49. *supra*).

72 "They have no ardour for their female."—It is Seeming coldness of the Americans to the sex accounted for.
true, they do not indulge those excesses, nor discover that fondness, which are customary in Europe; but this is not owing to a defect in nature, but to manners. Their soul is wholly bent upon war. This is what produces their glory among the men, and makes them the admiration of the women. To this they are educated from their earliest youth. When they pursue game with ardour, when they bear the fatigues of the chase, when they sustain and suffer patiently hunger and cold, it is not so much for the sake of the game they pursue, as to convince their parents and the council of the nation, that they are fit to be enrolled in the number of the warriors. The songs of the women, the dance of the warriors, the sage counsel of the chiefs, the tales of the old, the triumphal entry of the warriors returning with success from battle, and the respect paid to those who distinguish themselves in battle, and in subduing their enemies, in short, every thing they see or hear, tends to inspire them with an ardent desire for military fame. If a young man were to discover a fondness for women before he has been to war, he would become the contempt of the men, and the scorn and ridicule of the women: or were he to indulge himself with a captive taken in war, and much more were he to offer violence in order to gratify his lust, he would incur indelible disgrace. The seeming frigid-

America. dity of the men, therefore, is the effect of manners, and not a defect of nature. They are neither more defective in ardour, nor more impotent with the female, than are the whites reduced to the same diet and exercise.

73
Why they
have few
children.

"They raise few children."—They indeed raise fewer children than we do; the causes of which are to be found, not in a difference of nature, but of circumstance. The women very frequently attending the men in their parties of war and of hunting, child-bearing becomes extremely inconvenient to them. It is said, therefore, that they have learned the practice of procuring abortion by the use of some vegetable; and that it even extends to prevent conception for a considerable time after. During these parties they are exposed to numerous hazards, to excessive exertions, to the greatest extremities of hunger. Even at their homes, the nation depends for food, through a certain part of every year, on the gleanings of the forest; that is, they experience a famine once in every year. With all animals, if the female be badly fed, or not fed at all, her young perish; and if both male and female be reduced to like want, generation becomes less active, less productive. To the obstacles, then, of want and hazard, which Nature has opposed to the multiplication of wild animals, for the purpose of restraining their numbers within certain bounds, those of labour and of voluntary abortion are added with the Indian. No wonder, then, if they multiply less than we do. Where food is regularly supplied, a single farm will show more of cattle than a whole country of forests can of buffaloes. The same Indian women, when married to white traders, who feed them and their children plentifully and regularly, who exempt them from excessive drudgery, who keep them stationary and unexposed to accident, produce and raise as many children as the white women. Instances are known, under these circumstances, of their rearing a dozen children.

74
Of their
sensibility,
&c.

Neither do they seem to be "deficient in natural affection." On the contrary, their sensibility is keen, even the warriors weeping most bitterly on the loss of their children; though in general they endeavour to appear superior to human events.

Their friendships are strong, and faithful to the utmost extremity. A remarkable instance of this appeared in the case of the late Col. Byrd, who was sent to the Cherokee nation to transact some business with them. It happened that some of our disorderly people had just killed one or two of that nation. It was therefore proposed in the council of the Cherokees, that Col. Byrd should be put to death, in revenge for the loss of their countrymen. Among them was a chief, called *Silouee*, who, on some former occasion, had contracted an acquaintance and friendship with Col. Byrd. He came to him every night in his tent, and told him not to be afraid, they should not kill him. After many days deliberation, however, the determination was, contrary to *Silouee's* expectation, that Byrd should be put to death, and some warriors were dispatched as executioners. *Silouee* attended them; and when they entered the tent, he threw himself between them and Byrd, and said to the warriors, "This man is my friend: before you get at him, you must kill me." On which they returned; and the council

Nº 14.

respected the principle so much as to recede from their determination. *America.*

That "they are timorous and cowardly," is a character with which there is little reason to charge them, when we recollect the manner in which the Iroquois met *Monf. —*, who marched into their country; in which the old men, who scorned to fly, or to survive the capture of their town, braved death like the old Romans in the time of the Gauls, and in which they soon after revenged themselves by sacking and destroying Montreal. In short, the Indian is brave, when an enterprise depends on bravery; education with him making the point of honour consist in the destruction of an enemy by stratagem, and in the preservation of his own person free from injury: or perhaps this is nature, while it is education which teaches us to honour force more than finess. He will defend himself against an host of enemies, always chusing to be killed rather than to surrender, though it be to the whites, who he knows will treat him well. In other situations, also, he meets death with more deliberation, and endures tortures with a firmness unknown almost to religious enthusiasm among us.

Much less are they to be characterised as a people of no vivacity, and who are excited to action or motion only by the calls of hunger and thirst. Their dances, in which they so much delight, and which to a European would be the most severe exercise, fully contradict this; not to mention their fatiguing marches, and the toil they voluntarily and cheerfully undergo in their military expeditions. It is true, that when at home they do not employ themselves in labour or the culture of the soil: but this, again, is the effect of customs and manners which have assigned that to the province of the women. But it is said, "they are averse to society and a social life." Can any thing be more inapplicable than this to a people who always live in towns or in clans? Or can they be said to have no *republique*, who conduct all their affairs in national councils; who pride themselves in their national character; who consider an insult or injury done to an individual by a stranger as done to the whole, and resent it accordingly?

To form a just estimate of their genius and mental powers, Mr Jefferson observes, more facts are wanting, and great allowance is to be made for those circumstances of their situation which call for a display of particular talents only. This done, we shall probably find that the Americans are formed, in mind as well as in body, on the same model with the *homo sapiens Europæus*. The principles of their society forbidding all compulsion, they are to be led to duty and to enterprise by personal influence and persuasion. Hence eloquence in council, bravery and address in war, become the foundations of all consequence with them. To these acquirements all their faculties are directed. Of their bravery and address in war we have multiplied proofs, because we have been the subjects on which they were exercised. Of their eminence in oratory we have fewer examples, because it is displayed chiefly in their own councils. Some, however, we have of very superior lustre. We may challenge the whole orations of Demosthenes and Cicero, and of any more eminent orator, if Europe has furnished more eminent, to produce a single passage superior to the speech

75
Of their
courage.
(See also
nº 54. 55.
supra).

America. speech of Logan, a Mingo chief, to Lord Dunmore when governor of this state. The story is as follows; of which, and of the speech, the authenticity is unquestionable. In the spring of the year 1774, a robbery and murder were committed on an inhabitant of the frontiers of Virginia by two Indians of the Shawanee tribe. The neighbouring whites, according to their custom, undertook to punish this outrage in a summary way. Colonel Cresap, a man infamous for the many murders he had committed on those much-injured people, collected a party, and proceeded down the Kanaway in quest of vengeance. Unfortunately a canoe of women and children, with one man only, was seen coming from the opposite shore, unarmed, and unsuspecting any hostile attack from the whites. Cresap and his party concealed themselves on the bank of the river; and the moment the canoe reached the shore, singled out their objects, and at one fire killed every person in it. This happened to be the family of Logan, who had long been distinguished as a friend of the whites. This unworthy return provoked his vengeance. He accordingly signalized himself in the war which ensued. In the autumn of the same year a decisive battle was fought at the mouth of the Great Kanaway, between the collected forces of the Shawanees, Mingoes, and Delawares, and a detachment of the Virginia militia. The Indians were defeated, and sued for peace. Logan, however, disdained to be seen among the suppliants; but, lest the sincerity of a treaty should be distrusted from which so distinguished a chief absented himself, he sent by a messenger the following speech, to be delivered to Lord Dunmore:—"I appeal to any white man to say if ever he entered Logan's cabin hungry, and he gave him not meat; if ever he came cold and naked, and he clothed him not. During the course of the last long and bloody war, Logan remained idle in his cabin, an advocate for peace. Such was my love for the whites, that my countrymen pointed as they passed, and said, *Logan is the friend of white men*. I had even thought to have lived with you, but for the injuries of one man. Colonel Cresap, the last spring, in cold blood, and unprovoked, murdered all the relations of Logan, not sparing even my women and children. There runs not a drop of my blood in the veins of any living creature. This called on me for revenge. I have sought it; I have killed many; I have fully glutted my vengeance. For my country, I rejoice at the beams of peace; but do not harbour a thought that mine is the joy of fear. Logan never felt fear. He will not turn on his heel to save his life. Who is there to mourn for Logan? Not one."

76
Story of
Logan.

77
Specimen
of Indian
eloquence.

78
Other a-
necdotes.

To the preceding anecdotes in favour of the American character, may be added the following by Dr Benjamin Franklin. The Indian men, when young, are hunters and warriors: when old, counsellors; for all their government is by the counsel or advice of the sages. Hence they generally study oratory; the best speaker having the most influence. The Indian women till the ground, dress the food, nurse and bring up the children, and preserve and hand down to posterity the memory of public transactions. These employments of men and women are accounted natural and honourable. Having few artificial wants, they have abundance of leisure for improvement by conversation. Our laborious manner of life, compared with theirs, they c-

VOL. I. Part II.

steem slavish and base; and the learning on which we value ourselves, they regard as frivolous and useless.

Having frequent occasions to hold public councils, they have acquired great order and decency in conducting them. The old men sit in the foremost ranks, the warriors in the next, and the women and children in the hindmost. The business of the women is to take exact notice of what passes; imprint it in their memories, for they have no writing, and communicate it to their children. They are the records of the council, and they preserve tradition of the stipulations in treaties a hundred years back; which, when we compare with our writings, we always find exact. He that would speak rises. The rest observe a profound silence. When he has finished, and sits down, they leave him five or six minutes to recollect, that if he has omitted any thing he intended to say, or has any thing to add, he may rise again and deliver it. To interrupt another, even in common conversation, is reckoned highly indecent.

The politeness of these savages in conversation is, indeed, carried to excess; since it does not permit them to contradict or deny the truth of what is asserted in their presence. By this means they indeed avoid disputes; but then it becomes difficult to know their minds, or what impression you make upon them. The missionaries who have attempted to convert them to Christianity, all complain of this as one of the great difficulties of their mission. The Indians hear with patience the truths of the gospel explained to them, and give their usual tokens of assent and approbation; but this by no means implies conviction; it is mere civility.

When any of them come into our towns, our people are apt to crowd round them, gaze upon them, and incommode them where they desire to be private; this they esteem great rudeness, and the effect of the want of instruction in the rules of civility and good manners. "We have," say they, "as much curiosity as you; and when you come into our towns, we wish for opportunities of looking at you; but for this purpose we hide ourselves behind bushes where you are to pass, and never intrude ourselves into your company."

Their manner of entering one another's villages has likewise its rules. It is reckoned uncivil in travelling strangers to enter a village abruptly, without giving notice of their approach. Therefore, as soon as they arrive within hearing, they stop and hollow, remaining there till invited to enter. Two old men usually come out to them and lead them in. There is in every village a vacant dwelling, called the *strangers house*. Here they are placed, while the old men go round from hut to hut, acquainting the inhabitants that strangers are arrived, who are probably hungry and weary; and every one sends them what he can spare of victuals, and skins to repose on. When the strangers are refreshed, pipes and tobacco are brought; and then, but not before, conversation begins, with inquiries who they are, whither bound, what news, &c. and it usually ends with offers of service; if the strangers have occasion for guides, or any necessaries for continuing their journey; and nothing is exacted for the entertainment.

The same hospitality, esteemed among them as a principal virtue, is practised by private persons; of which Conrad Weiser, the interpreter, gave Dr Franklin the following instance: He had been naturalized

4 B

among

America.

79
Politeness
and civility
of the Ame-
rican In-
dians.

85

Their hos-
pitality.

America.

among the Six Nations, and spoke well the Mohock language. In going through the Indian country to carry a message from our governor to the council at Onondaga, he called at the habitation of Canassatego, an old acquaintance, who embraced him, spread furs for him to sit on, placed before him some boiled beans and venison, and mixed some rum and water for his drink. When he was well refreshed, and had lit his pipe, Canassatego began to converse with him: asked how he had fared the many years since they had seen each other, whence he then came, what had occasioned the journey, &c. Conrad answered all his questions; and when the discourse began to flag, the Indian, to continue it, said, "Conrad, you have lived long among the white people, and know something of their customs; I have been sometimes at Albany, and have observed, that once in seven days they shut up their shops, and assemble all in the great house; tell me what it is for?—What do they do there?" "They meet there," says Conrad, "to hear and learn *good things*." "I do not doubt," says the Indian, "that they tell you so; they have told me the same: but I doubt the truth of what they say, and I will tell you my reasons. I went lately to Albany to sell my skins, and buy blankets, knives, powder, rum, &c. You know I generally used to deal with Hans Hanson; but I was a little inclined this time to try some other merchants. However I called first upon Hans, and asked him what he would give for beaver. He said he could not give more than 4s. a pound; but (says he) I cannot talk on business now; this is the day when we meet together to learn *good things*, and I am going to the meeting. So I thought to myself, since I cannot do any business to-day, I may as well go to the meeting too; and I went with him. —There stood up a man in black, and began to talk to the people very angrily. I did not understand what he said; but perceiving that he looked much at me and at Hanson, I imagined he was angry at seeing me there: so I went out, sat down near the house, struck fire, and lit my pipe, waiting till the meeting should break up. I thought too, that the man had mentioned something of beaver, and I suspected that it might be the subject of their meeting. So when they came out, I accosted my merchant.—Well, Hans, (says I,) I hope you have agreed to give more than 4s. a pound?" "No, (says he), I cannot give so much, I cannot give more than 3s. 6d." "I then spoke to several other dealers, but they all sung the same song, three and sixpence, three and sixpence. This made it clear to me that my suspicion was right; and that whatever they pretended of meeting to learn *good things*, the real purpose was, to consult how to cheat Indians in the price of beaver. Consider but a little, Conrad, and you must be of my opinion. If they met so often to learn *good things*, they certainly would have learned some before this time. But they are still ignorant. You know our practice. If a white man, in travelling through our country, enters one of our cabins, we all treat him as I treat you; we dry him if he is wet, we warm him if he is cold, and give him meat and drink, that he may allay his thirst and hunger; and we spread soft furs for him to rest and sleep on: we demand nothing in return. But if I go into a white man's house at Albany, and ask for victuals and drink, they say, Where is your money? And if I have none, they say, Get out, you Indian dog. You see they have not yet learned

those little *good things* that we need no meeting to be instructed in; because our mothers taught them to us when we were children; and therefore it is impossible their meetings should be, as they say, for any such purpose or have any such effect; they are only to contrive *the cheating of Indians in the price of beaver*."

The next question that occurs is, Whether the peculiarities of the Americans, or the disparity between them and the inhabitants of Europe, afford sufficient grounds for determining them, as some have done, to be a race of men radically different from all others?

In this question, to avoid being tedious, we shall confine ourselves to what has been advanced by Lord Kames; who is of opinion, that there are many different species of men, as well as of other animals; and gives an hypothesis, whereby he pretends his opinion may be maintained in a consistency with Revelation. 81
"If (says he) the only rule afforded by nature for classifying animals can be depended on, there are different Lord Kames's arguments for different species, races of men as well as of dogs: a mastiff differs more from a spaniel, than a white man from a negro, or a Laplander from a Dane. And, if we have any faith in Providence, it ought to be so. Plants were created of different kinds, to fit them for different climates; and so were brute animals. Certain it is, that all men are not fitted equally for every climate. There is scarce a climate but what is natural to some men, where they prosper and flourish; and there is not a climate but where some men degenerate. Doth not then analogy lead us to conclude, that, as there are different climates on the face of this globe, so there are different races of men fitted for these different climates?"

"M. Buffon, from the rule, That animals which can procreate together, and whose progeny can also procreate, are of one species; concludes, that all men are of one race or species; and endeavours to support that favourite opinion, by ascribing to the climate, to food, or to other accidental causes, all the varieties that are found among men. But is he seriously of opinion, that any operation of climate, or of other accidental cause, can account for the copper colour and smooth chin universal among the Americans; the prominence of the pudenda universal among the Hottentot women; or the black nipple no less universal among the female Samoiedes?—It is in vain to ascribe to the climate, the low stature of the Esquimaux, the smallness of their feet, or the overgrown size of their heads. It is equally in vain to ascribe to climate the low stature of the Laplanders, or their ugly visage. The black colour of negroes, thick lips, flat nose, crisped woolly hair, and rank smell, distinguish them from every other race of men. The Abyssinians, on the contrary, are tall and well made, their complexion a brown olive, features well-proportioned, eyes large and of a sparkling black, thin lips, a nose rather high than flat. There is no such difference of climate between Abyssinia and Negro-land as to produce these striking differences.

"Nor shall our author's ingenious hypothesis concerning the extremities of heat and cold, purchase him impunity with respect to the fallow complexion of the Samoiedes, Laplanders, and Greenlanders. The Finlanders, and northern Norwegians, live in a climate not less cold than that of the people mentioned; and yet are fair beyond other Europeans. I say more, there are many instances of races of people preserving their

America. their original colour, in climates very different from their own; but not a single instance of the contrary, as far as I can learn. There have been four complete generations of negroes in Pennsylvania, without any visible change of colour; they continue jet black, as originally. Those who ascribe all to the sun, ought to consider how little probable it is, that the colour it impresses on the parents should be communicated to their infant children, who never saw the sun: I should be as soon induced to believe with a German naturalist, whose name has escaped me, that the negro colour is owing to an ancient custom in Africa, of dyeing the skin black. Let a European, for years, expose himself to the sun in a hot climate, till he be quite brown; his children will nevertheless have the same complexion with those in Europe. From the action of the sun, is it possible to explain, why a negro, like a European, is born with a ruddy skin, which turns jet black the eighth or ninth day?"

Our author next proceeds to draw some arguments for the existence of different races of men, from the various tempers and dispositions of different nations; which he reckons to be *specific* differences, as well as those of colour, stature, &c. and having summed up his evidence, he concludes thus: "Upon summing up the whole particulars mentioned above, would one hesitate a moment to adopt the following opinion, were there no counterbalancing evidence, viz. 'That God created many pairs of the human race, differing from each other, both externally and internally; that he fitted those pairs for different climates, and placed each pair in its proper climate; that the peculiarities of the original pairs were preserved entire in their descendants; who, having no assistance but their natural talents, were left to gather knowledge from experience; and, in particular, were left (each tribe) to form a language for itself; that signs were sufficient for the original pairs, without any language but what nature suggests; and that a language was formed gradually as a tribe increased in numbers, and in different occupations, to make speech necessary?' But this opinion, however plausible, we are not permitted to adopt: being taught a different lesson by Revelation, viz. That God created but a single pair of the human species. Though we cannot doubt the authority of Moses, yet his account of the creation of man is not a little puzzling, as it seems to contradict every one of the facts mentioned above. According to that account different races of men were not formed, nor were men formed originally for different climates. All men must have spoken the same language, viz. That of our first parents. And what of all seems the most contradictory to that account, is the savage state: Adam, as Moses informs us, was endued by his Maker with an eminent degree of knowledge; and he certainly was an excellent preceptor to his children and their progeny, among whom he lived many generations. Whence then the degeneracy of all men unto the savage state? To account for that dismal catastrophe, mankind must have suffered some terrible convulsion. That terrible convulsion is revealed to us in the history of the tower of Babel, contained in the 11th chapter of Genesis, which is, 'That, for many centuries after the deluge, the whole earth was of one language, and of one speech; that they united to

'build a city on a plain in the land of Shinar, with a tower, whose top might reach unto heaven; that the Lord, beholding the people to be one, and to have all one language, and that nothing would be restrained from them which they imagined to do, confounded their language that they might not understand one another, and scattered them abroad upon the face of all the earth.' Here light breaks forth in the midst of darkness. By confounding the language of men, and scattering them abroad upon the face of all the earth, they were rendered savages. And to harden them for their new habitations, it was necessary that they should be divided into different kinds, fitted for different climates. Without an immediate change of constitution, the builders of Babel could not possibly have subsisted in the burning region of Guinea, nor in the frozen region of Lapland; houses not being prepared, nor any other convenience to protect them against a destructive climate."

We may first remark, on his Lordship's hypothesis, ⁸³ that it is evidently incomplete; for, allowing the human race to have been divided into different species at the confusion of languages, and that each species was adapted to a particular climate; by what means were they to get to the climates proper for them, or how were they to know that such climates existed? How was an American, for instance, when languishing in an improper climate at Babel, to get to the land of the Amazons, or the banks of the Oronoko, in his own country? or how was he to know that these places were more proper for him than others?—If, indeed, we take the scripture phrase, "The Lord scattered them abroad upon the face of all the earth," in a certain sense, we may account for it. If we suppose that the different species were immediately carried off by a whirlwind, or other supernatural means, to their proper countries, the difficulty will vanish: but if this is his Lordship's interpretation, it is certainly a very singular one.

Before entering upon a consideration of the particular arguments used by our author for proving the diversity of species in the human race, it will be proper to lay down the following general principles, which may serve as axioms. ⁸⁴ (1.) When we assert a multiplicity of species in the human race; we bring in a supernatural cause to solve a natural phenomenon: for these species are supposed to be the immediate work of the Deity. (2.) No person has a right to call any thing the immediate effect of omnipotence, unless by express revelation from the Deity, or from a certainty that no natural cause is sufficient to produce the effect. The reason is plain. The Deity is invisible, and so are many natural causes: when we see an effect therefore, of which the cause does not manifest itself, we cannot know whether the immediate cause is the Deity, or an invisible natural power. An example of this we have in the phenomena of thunder and earthquakes, which were often ascribed immediately to the Deity, but are now discovered to be the effects of electricity. (3.) No person can assert natural causes to be insufficient to produce such and such effects, unless he perfectly knows all these causes and the limits of their power in all possible cases; and this no man has ever known, or can know.

By keeping in view these principles, which we hope are self-evident, we will easily see Lord Kames's arguments

⁸² His hypothesis concerning the origin of the different species.

General principles to be kept in view in reasoning on this subject.

America. arguments to consist entirely in a *petitio principii*.—In substance they are all reduced to this single sentence: "Natural philosophers have been hitherto unsuccessful in their endeavours to account for the differences observed among mankind, therefore these differences cannot be accounted for from natural causes."

85
Inconsistency in Lord Kames's arguments

His Lordship, however, tells us in the passages already quoted, that "a mastiff differs not more from a spaniel, than a Laplander from a Dane;" that "it is vain to ascribe to climate the low stature of the Laplanders, or their ugly visage."—Yet, in a note on the word *Laplanders*, he subjoins, that, "by late accounts it appears, that the Laplanders are only degenerated Tartars; and that they and the Hungarians originally sprung from the same breed of men, and from the same country."—The Hungarians are generally handsome and well-made, like Danes, or like other people. The Laplanders, he tells us, differ as much from them as a mastiff from a spaniel. Natural causes, therefore, according to Lord Kames himself, may cause two individuals of the same species of mankind differ from each other as much as a mastiff does from a spaniel.

86
Remarkable difference of colour from accidental causes.

While we are treating this subject of colour, it may not be amiss to observe, that a very remarkable difference of colour may accidentally happen to individuals of the same species. In the isthmus of Darien, a singular race of men have been discovered.—They are of low stature, of a feeble make, and incapable of enduring fatigue. Their colour is a dead milk white; not resembling that of fair people among Europeans, but without any blush or sanguine complexion. Their skin is covered with a fine hairy down of a chalky white; the hair of their heads, their eye-brows, and eye-lashes, are of the same hue. Their eyes are of a singular form, and so weak, that they can hardly bear the light of the sun; but they see clearly by moon-light, and are most active and gay in the night. Among the negroes of Africa, as well as the natives of the Indian islands, a small number of these people are produced. They are called *Albinos* by the Portuguese, and *Kackerlakes* by the Dutch.

87
Colour no characteristic of a different species.

This race of men is not indeed permanent; but it is sufficient to show, that mere colour is by no means the characteristic of a certain species of mankind. The difference of colour in these individuals is undoubtedly owing to a natural cause. To constitute, then, a race of men of this colour, it would only be necessary that this cause, which at present is merely accidental, should become permanent, and we cannot know but it may be so in some parts of the world.

88
Nor stature.

* See Patagonia.

If a difference in colour is no characteristic of a different species of mankind, much less can a difference in stature be thought so.—In the southern parts of America, there are said to be a race of men exceeding the common size in height and strength*. This account, however, is doubted of by some: but be that as it will, it is certain that the Esquimaux are as much under the common size, as the Patagonians are said to be above it. Nevertheless we are not to imagine, that either of these are specific differences; seeing the Laplanders and Hungarians are both of the same species, and yet the former are generally almost a foot shorter than the latter; and if a difference of climate, or other accidental causes, can make the people of one country a foot shorter than the common size of mankind, un-

doubtedly accidental causes of a contrary nature may make those of another country a foot taller than other men.

89
Different causes contribute towards an alteration in colour.
Though the sun has undoubtedly a share in the production of the swarthy colour of those nations which are most exposed to his influence; yet the manner of living to which people are accustomed, their victuals, their employment, &c. must contribute very much to a difference of complexion. There are some kinds of colouring roots, which, if mixed with the food of certain animals, will tinge even their bones of a yellow colour.—It cannot be thought any great degree of credulity to infer from this, that if these roots were mixed with the food of a white man, they might, without a miracle, tinge his skin of a yellow colour. If a man and woman were both to use food of this kind for a length of time, till they became as it were *radically dyed*, it is impossible, without the intervention of divine power, or of some extraordinary natural cause, but their children must be of the same colour; and was the same kind of food to be continued for several generations, it is more than probable that this colour might resist the continued use of any kind of food whatever. See further the article COMPLEXION.

90
Habit capable of altering the instinct of animals.
Of this indeed we have no examples, but we have an example of changes much more wonderful.—It is allowed on all hands, that it is more easy to work a change upon the body of a man, or any other animal, than upon his mind. A man that is naturally choleric may indeed learn to prevent the bad effects of his passion by reason, but the passion itself will remain as immutable as his colour.—But to reason in a manner similar to Lord Kames; though a man should be naturally choleric, or subject to any other passion, why should his children be so?—This way of reasoning, however plausible, is by no means conclusive, as will appear from the following passage in Mr Forster's Voyage.

June 9th. "The officers who could not yet relish their salt provisions after the refreshments of New Zealand, had ordered their black dog, mentioned p. 135, to be killed: this day, therefore, we dined for the first time on a leg of it roasted; which tasted so exactly like mutton, that it was absolutely undistinguishable. In our cold countries, where animal food is so much used, and where to be carnivorous perhaps lies in the nature of men, or is indispensibly necessary to the preservation of their health and strength, it is strange that there should exist a Jewish aversion to dogs-flesh, when hogs, the most uncleanly of all animals, are eaten without scruple. Nature seems expressly to have intended them for this use, by making their offspring so very numerous, and their increase so quick and frequent. It may be objected, that the exalted degree of instinct which we observe in our dogs, inspires us with great unwillingness to kill and eat them. But it is owing to the time we spend on the education of dogs, that they acquire those eminent qualities which attach them so much to us. The natural qualities of our dogs may receive a wonderful improvement; but education must give its assistance, without which the human mind itself, tho' capable of an immense expansion, remains in a very contracted state. In New Zealand, and (according to former accounts of voyages) in the tropical isles of the South Sea, the dogs are the most stupid, dull animals imaginable,

America. imaginable, and do not seem to have the least advantage in point of sagacity over our sheep, which are commonly made the emblems of silliness. In the former country they are fed upon fish, in the latter on vegetables, and both these diets may have served to alter their disposition. Education may perhaps likewise graft new instincts: the New Zealand dogs are fed on the remains of their master's meals; they eat the bones of other dogs; and the puppies become true cannibals from their birth. We had a young New Zealand puppy on board, which had certainly had no opportunity of tasting any thing but the mother's milk before we purchased it: however, it eagerly devoured a portion of the flesh and bones of the dog on which we dined today; while several others of the European breed taken on board at the Cape, turned from it without touching it.

Ibid. p. 243. "On the 4th of August, a young bitch, of the terrier breed, taken on board at the Cape of Good Hope, and covered by a spaniel, brought ten young ones, one of which was dead. The New Zealand dog mentioned above, which devoured the bones of the roasted dog, now fell upon the dead puppy, and eat of it with a ravenous appetite. This is a proof how far education may go in producing and propagating new instincts in animals. European dogs are never fed on the meat of their own species, but rather seem to abhor it. The New Zealand dogs, in all likelihood, are trained up from their earliest age to eat the remains of their master's meals: they are therefore used to feed upon fish; their own species; and perhaps human flesh; and what was only owing to habit at first, may have become instinct by length of time. This was remarkable in our cannibal dog; for he came on board so young, that he could not have been weaned long enough to have acquired a habit of devouring his own species, and much less of eating human flesh; however, one of our seamen having cut his finger, held it out to the dog, who fell too greedily, licked it, and then began to bite it."

From this account it appears, that even the instincts of animals are not unchangeable by natural causes; and if these causes are powerful enough to change the dispositions of succeeding generations, much more may we suppose them capable of making any possible alteration in the external appearance.

Confirmed by an observation on the Franks. We are not here necessitated to confine ourselves to observations made on brute animals. The Franks are an example of the production of one general character, formed by some natural cause from a mixture of many different nations.—They were a motley multitude, consisting of various German nations dwelling beyond the Rhine: who, uniting in defence of their common liberty, took thence the name of *Franks*; the word *frank* signifying in their language, as it still does in ours, *free*. Among them the following nations were mentioned, viz. the Actuarii, Chamavi, Bructeri, Salii, Frisii, Chausi, Amisvarii, and Catti. We cannot suppose one character to belong to so many different nations; yet it is certain that the Franks were nationally characterized as treacherous; and so deeply seems this quality to have been rooted in their nature, that their descendants have not got quite free of it in 1500 years. It is in vain, then, to talk of different races of men, either from their colour, size, or prevailing dispositions, seeing we have undeniable proofs that all these

may be changed, in the most remarkable manner, by **America.** natural causes, without any miraculous interposition of the Deity.

The next question, then, which presents itself, is, From what part of the Old World America has most probably been peopled?

Discoveries long ago made inform us, that an intercourse between the Old Continent and America might be carried on with facility from the north-west extremities of Europe and the north-east boundaries of Asia. In the ninth century the Norwegians discovered Greenland, and planted a colony there. The communication with that country was renewed in the last century by Moravian missionaries, in order to propagate their doctrines in that bleak and uncultivated region. By them we are informed that the north-west coast of Greenland is separated from America by a very narrow strait; that at the bottom of the bay it is highly probable that they are united; that the Esquimaux of America perfectly resemble the Greenlanders in their aspect, dress, and mode of living; and that a Moravian missionary, well acquainted with the language of Greenland, having visited the country of the Esquimaux, found, to his astonishment, that they spoke the same language with the Greenlanders, and were in every respect the same people. The same species of animals, too, are found in the contiguous regions. The bear, the wolf, the fox, the hare, the deer, the roebuck, the elk, frequent the forests of North America, as well as those in the north of Europe.

Other discoveries have proved, that if the two continents of Asia and America be separated at all, it is only by a narrow strait. From this part of the Old Continent, also, inhabitants may have passed into the New; and the resemblance between the Indians of America and the eastern inhabitants of Asia, would induce us to conjecture that they have a common origin. This is the opinion adopted by Dr Robertson in his *History of America**, where we find it accompanied with the following narrative.

"While those immense regions which stretched eastward from the river Oby to the sea of Kamtschatka were unknown, or imperfectly explored, the north-east extremities of our hemisphere were supposed to be so far distant from any part of the New World, that it was not easy to conceive how any communication should have been carried on between them. But the Russians, having subjected the western part of Siberia to their empire, gradually extended their knowledge of that vast country, by advancing towards the east into unknown provinces. These were discovered by hunters in their excursions after game, or by soldiers employed in levying the taxes; and the court of Moscow estimated the importance of those countries only by the small addition which they made to its revenue. At length, Peter the Great ascended the Russian throne: His enlightened, comprehensive mind, intent upon every circumstance that could aggrandize his empire, or render his reign illustrious, discerned consequences of those discoveries, which had escaped the observation of his ignorant predecessors. He perceived, that, in proportion as the regions of Asia extended towards the east, they must approach nearer to America; that the communication between the two continents, which had long been search-

101

Of the people of America.

102

A communication between the Old and New Continents by two ways.

* *History of America*, Vol. I. p. 273.

America. ed for in vain, would probably be found in this quarter; and that, by opening this intercourse, some part of the wealth and commerce of the western world might be made to flow into his dominions by a new channel. Such an object suited a genius that delighted in grand schemes. Peter drew up instructions with his own hand for prosecuting this design, and gave orders for carrying it into execution.

"His successors adopted his ideas, and pursued his plan. The officers whom the Russian court employed in this service, had to struggle with so many difficulties, that their progress was extremely slow. Encouraged by some faint traditions among the people of Siberia concerning a successful voyage in the year 1648 round the north-east promontory of Asia, they attempted to follow the same course. Vessels were fitted out, with this view, at different times, from the rivers Lena and Kolyma; but in a frozen ocean, which nature seems not to have destined for navigation, they were exposed to many disasters, without being able to accomplish their purpose. No vessel fitted out by the Russian court ever doubled this formidable cape; we are indebted for what is known of those extreme regions of Asia, to the discoveries made in excursions by land. In all those provinces, an opinion prevails, that countries of great extent and fertility lie at no considerable distance from their own coasts. These the Russians imagined to be part of America; and several circumstances concurred not only in confirming them in this belief, but in persuading them that some portion of that continent could not be very remote. Trees of various kinds, unknown in those naked regions of Asia, are driven upon the coast by an easterly wind. By the same wind floating ice is brought thither in a few days; flights of birds arrive annually from the same quarter; and a tradition obtains among the inhabitants, of an intercourse formerly carried on with some countries situated to the east.

"After weighing all these particulars, and comparing the position of the countries in Asia which they had discovered, with such parts in the north-west of America as were already known; the Russian court formed a plan, which would have hardly occurred to any nation less accustomed to engage in arduous undertakings and to contend with great difficulties. Orders were issued to build two vessels at Ochotz, in the sea of Kamtschatka, to sail on a voyage of discovery. Though that dreary uncultivated region furnished nothing that could be of use in constructing them but some larch-trees; though not only the iron, the cordage, the sails, and all the numerous articles requisite for their equipment, but the provisions for victualling them, were to be carried through the immense deserts of Siberia, along rivers of difficult navigation, and roads almost impassable, the mandate of the sovereign, and the perseverance of the people, at last surmounted every obstacle. Two vessels were finished; and, under the command of the captains Behring and Tschirikow, sailed from Kamtschatka in quest of the New World, in a quarter where it had never been approached. They shaped their course towards the east; and though a storm soon separated the vessels, which never rejoined, and many disasters befel them, the expectations from the voyage were not altogether frustrated. Each of the commanders discovered land, which to them appeared

to be part of the American continent; and, according to their observations, it seems to be situated within a few degrees of the north-west coast of California. Each set some of his people ashore: but in one place the inhabitants fled as the Russians approached; in another, they carried off those who landed, and destroyed their boats. The violence of the weather, and the distress of their crews, obliged both to quit this inhospitable coast. In their return they touched at several islands, which stretch in a chain from east to west between the country which they had discovered and the coast of Asia. They had some intercourse with the natives, who seemed to them to resemble the North Americans. They presented to the Russians the calumet, or pipe of peace, which is a symbol of friendship universal among the people of North America, and an usage of arbitrary institution peculiar to them."

The more recent and accurate discoveries of the illustrious navigator Cooke, and his successor Clerke, have brought the matter still nearer to certainty. The sea, from the south of Bering's Straits to the crescent of isles between Asia and America, is very shallow. It deepens from these straits (as the British seas do from those of Dover) till soundings are lost in the Pacific Ocean; but that does not take place but to the south of the isles. Between them and the straits is an increase from 12 to 54 fathom, except only off St Thaddeus Nos, where there is a channel of greater depth. From the volcanic disposition, it has been judged probable, not only that there was a separation of the continents at the straits of Bering, but that the whole space from the isles to that small opening had once been occupied by land; and that the fury of the watery element, actuated by that of fire, had, in most remote times, subverted and overwhelmed the tract, and left the islands monumental fragments.

Without adopting all the fancies of Buffon, there can be no doubt, as the Abbé Clavigero observes, that our planet has been subject to great vicissitudes since the deluge. Ancient and modern histories confirm the truth which Ovid has sung in the name of Pythagoras:

*Video ego quod fuerat quondam solidissima tellus,
Esse fretum; vidi factas ex aquore terras.*

At present they plough those lands over which ships formerly sailed, and now they sail over lands which were formerly cultivated; earthquakes have swallowed some lands, and subterraneous fires have thrown up others: the rivers have formed new soil with their mud; the sea retreating from the shores has lengthened the land in some places, and advancing in others has diminished it; it has separated some territories which were formerly united, and formed new straits and gulphs. We have examples of all these revolutions in the past century. Sicily was united to the continent of Naples, as Eubœa, now the Black Sea, to Bœotia. Diodorus, Strabo, and other ancient authors, say the same thing of Spain and Africa, and affirm, that by a violent eruption of the ocean upon the land between the mountains Abyla and Calpe, that communication was broken, and the Mediterranean Sea was formed. Among the people of Ceylon there is a tradition that a similar irruption of the sea separated their island from the peninsula of India. The same thing is believed by those of Malabar with respect to the isles of Maldivia, and

America and with the Malaysians with respect to Sumatra. It is certain, says the Count de Buffon, that in Ceylon the earth has lost 30 or 40 leagues, which the sea has taken from it; on the contrary, Tongres, a place of the Low Countries, has gained 30 leagues of land from the sea. The northern part of Egypt owes its existence to inundations of the Nile. The earth which this river has brought from the inland countries of Africa, and deposited in its inundations, has formed a soil of more than 25 cubits of depth. In like manner, adds the above author, the province of the Yellow River in China, and that of Louisiana, have only been formed of the mud of rivers. Pliny, Seneca, Diodorus, and Strabo, report innumerable examples of similar revolutions, which we omit, that our dissertation may not become too prolix; as also many modern revolutions, which are related in the theory of the earth of the Count de Buffon and other authors. In South America, all those who have observed with philosophic eyes the peninsula of Yucatan, do not doubt that that country has once been the bed of the sea; and, on the contrary, in the channel of Bahama many indications show the island of Cuba to have been once united to the continent of Florida. In the strait which separates America from Asia many islands are found, which probably were the mountains belonging to that tract of land which we suppose to have been swallowed up by earthquakes; which is made more probable by the multitude of volcanoes which we know of in the peninsula of Kamtschatka. It is imagined, however, that the sinking of that land, and the separation of the two continents, has been occasioned by those great and extraordinary earthquakes mentioned in the histories of the Americans, which formed an æra almost as memorable as that of the deluge. The histories of the Toltecas fix such earthquakes in the year I Tecpatl; but as we know not to what century that belonged, we can form no conjecture of the time that great calamity happened. If a great earthquake should overwhelm the isthmus of Suez, and there should be at the same time as great a scarcity of historians as there were in the first ages after the deluge, it would be doubted, in 300 or 400 years after, whether Asia had ever been united by that part to Africa; and many would firmly deny it.

105
Separated
only by a
narrow
strait.

106
Ease of
the passage
between
them.

Whether that great event, the separation of the continents, took place before or after the population of America, is as impossible as it is of little moment for us to know; but we are indebted to the above mentioned navigators for settling the long dispute about the point from which it was effected. Their observations prove, that in one place the distance between continent and continent is only 39 miles, not (as the author of the *Recherches Philosophiques sur les Américains* would have it) 800 leagues. This narrow strait has also in the middle two islands, which would greatly facilitate the migration of the Asiatics into the New World, supposing that it took place in canoes after the convulsion which rent the two continents asunder. Besides, it may be added, that these straits are, even in the summer, often filled with ice; in winter, often frozen. In either case mankind might find an easy passage; in the last, the way was extremely ready for quadrupeds to cross and stock the continent of America. But where, from the vast expanse of the north-eastern world, to fix on the first tribes who contributed to people the New

Continent, now inhabited almost from end to end, is a matter that baffles human reason. The learned may make bold and ingenious conjectures, but plain good sense cannot always accede to them.

As mankind increased in numbers, they naturally protruded one another forward. Wars might be another cause of migrations. There appears no reason why the Asiatic north might not be an *officina virorum*, as well as the European. The overteeming country, to the east of the Riphæan mountains, must find it necessary to discharge its inhabitants: the first great wave of people was forced forward by the next to it, more tumid and more powerful than itself: successive and new impulses continually arriving, short rest was given to that which spread over a more eastern tract; disturbed again and again, it covered fresh regions; at length, reaching the farthest limits of the Old World, found a new one, with ample space to occupy unmolested for ages; till Columbus cursed them by a discovery, which brought again new sins and new deaths to both worlds.

“The inhabitants of the New World (Mr Pennant observes), do not consist of the offspring of a single nation; different people, at several periods, arrived there; and it is impossible to say, that any one is now to be found on the original spot of its colonization. It is impossible, with the lights which we have so recently received, to admit that America could receive its inhabitants (at least the bulk of them) from any other place than eastern Asia. A few proofs may be added, taken from customs or dresses common to the inhabitants of both worlds: some have been long extinct in the old, others remain in both in full force.

“The custom of scalping was a barbarism in use with the Scythians, who carried about them at all times this savage mark of triumph: they cut a circle round the neck, and stripped off the skin, as they would that of an ox. A little image found among the Kalmucs, of a Tartarian deity, mounted on a horse, and sitting on a human skin, with scalps pendent from the breast, fully illustrates the custom of the Scythian progenitors, as described by the Greek historian. This usage, as the Europeans know by horrid experience, is continued to this day in America. The ferocity of the Scythians to their prisoners extended to the remotest part of Asia. The Kamtschatkans, even at the time of their discovery by the Russians, put their prisoners to death by the most lingering and excruciating inventions; a practice in full force to this very day among the aboriginal Americans. A race of the Scythians were styled *Anthropophagi*, from their feeding on human flesh. The people of Nootka Sound still make a repast on their fellow-creatures: but what is more wonderful, the savage allies of the British army have been known to throw the mangled limbs of the French prisoners into the horrible cauldron, and devour them with the same relish as those of a quadruped.

“The Scythians were said, for a certain time, annually to transform themselves into wolves, and again to resume the human shape. The new discovered Americans about Nootka Sound, at this time disguise themselves in dresses made of the skins of wolves and other wild beasts, and wear even the heads fitted to their own. These habits they use in the chase, to circumvent the animals of the field. But would not ignorance or superstition ascribe to a supernatural metamorphosis

107
Conjec-
tures con-
cerning the
first migra-
tions into
the New
Continent.

108
Mr Pen-
nant's opi-
nion.

109
The bulk
of its inha-
bitants prob-
ably first
received
from the
eastern
part of Asia

110
Proofs
from a si-
milarity of
customs,
&c.

America. tamorphosis these temporary expedients to deceive the brute creation?

III "In their marches, the Kamtschatkans never went abreast, but followed one another in the same tract. The same custom is exactly observed by the Americans.

Customs and dresses common to the eastern Asiatics and the Americans. "The Tungusi, the most numerous nation resident in Siberia, prick their faces with small punctures, with a needle, in various shapes; then rub into them charcoal, so that the marks become indelible. This custom is still observed in several parts of America. The Indians on the back of Hudson's bay, to this day, perform the operation exactly in the same manner, and puncture the skin into various figures; as the natives of New Zealand do at present, and as the ancient Britons did with the herb glastum, or woad; and the Virginians, on the first discovery of that country by the English.

"The Tungusi use canoes made of birch-bark, distended over ribs of wood, and nicely sewed together. The Canadian, and many other American nations, use no other sort of boats. The paddles of the Tungusi are broad at each end; those of the people near Cook's river, and of Oonalascha, are of the same form.

"In burying of the dead, many of the American nations place the corpse at full length, after preparing it according to their customs; others place it in a sitting posture, and lay by it the most valuable cloathing, wampum, and other matters. The Tartars did the same: and both people agree in covering the whole with earth, so as to form a tumulus, barrow, or carnedd.

"Some of the American nations hang their dead in trees. Certain of the Tungusi observe a similar custom.

"We can draw some analogy from dress: convenience in that article must have been consulted on both continents, and originally the materials must have been the same, the skins of birds and beasts. It is singular, that the conic bonnet of the Chinese should be found among the people of Nootka. I cannot give into the notion, that the Chinese contributed to the population of the New World; but we can readily admit, that a shipwreck might furnish those Americans with a pattern for that part of the dress.

II2: Other resemblances.

"In respect to the features and form of the human body, almost every tribe found along the western coast has some similitude to the Tartar nations, and still retain the little eyes, small noses, high cheeks, and broad faces. They vary in size, from the lusty Calmucs to the little Nogaïans. The internal Americans, such as the Five Indian nations, who are tall of body, robust in make, and of oblong faces, are derived from a variety among the Tartars themselves. The fine race of Tschutski seem to be the stock from which those Americans are derived. The Tschutski, again, from that fine race of Tartars the Kabardinski, or inhabitants of Kabarda.

"But about Prince William's Sound begins a race chiefly distinguished by their dress, their canoes, and their instruments of the chase, from the tribes to the south of them. Here commences the Esquimaux people, or the race known by that name in the high latitudes of the eastern side of the continent. They may be divided into two varieties. At this place they are

Nº 15.

of the largest size. As they advance northward they decrease in height, till they dwindle into the dwarfish tribes which occupy some of the coasts of the Icy Sea, and the maritime parts of Hudson's Bay, of Greenland, and Terra de Labrador. The famous Japanese map places some islands seemingly within the Straits of Bering, on which is bestowed the title of *Ya Zue*, or the Kingdom of the Dwarfs. Does not this in some manner authenticate the chart, and give us reason to suppose that America was not unknown to the Japanese; and that they had (as is mentioned by Kämpfer and Charlevoix) made voyages of discovery, and according to the last, actually wintered on the continent? That they might have met with the Esquimaux is very probable; whom, in comparison of themselves, they might justly distinguish by the name of *dwarfs*. The reason of their low stature is very obvious: these dwell in a most severe climate, amidst penury of food; the former in one much more favourable, abundant in provisions; circumstances that tend to prevent the degeneracy of the human frame. At the island of Oonalascha, a dialect of the Esquimaux is in use, which was continued along the whole coast from thence northward."

II3 The brute creation migrated by the same route. The continent which stocked America with the human race poured in the brute creation through the same passage. Very few quadrupeds continued in the peninsula of Kamtschatka; Mr Pennant enumerates only 25 which are inhabitants of land: all the rest persisted in their migration, and fixed their residence in the New World. Seventeen of the Kamtschatkan quadrupeds are found in America: others are common only to Siberia or Tartary, having, for unknown causes, entirely evacuated Kamtschatka, and divided themselves between America and the parts of Asia above cited. Multitudes again have deserted the Old World even to an individual, and fixed their seats at distances most remote from the spot from which they took their departure; from mount Ararat, the resting-place of the ark, in a central part of the Old World, and excellently adapted for the dispersion of the animal creation to all its parts. "We need not be startled (says Mr Pennant) at the vast journeys many of the quadrupeds took to arrive at their present seats. Might not numbers of species have found a convenient abode in the vast Alps of Asia, instead of wandering to the Cordilleras of Chili? or might not others have been contented with the boundless plains of Tartary, instead of travelling thousands of miles to the extensive flats of Pampas?—To endeavour to elucidate common difficulties is certainly a trouble worthy of the philosopher and of the divine; not to attempt it would be a criminal indolence, a neglect to

Vindicate the ways of God to man.

But there are multitudes of points beyond the human ability to explain, and yet are truths undeniable: the facts are indisputable, notwithstanding the causes are concealed. In such cases, faith must be called in to our relief. It would certainly be the height of folly to deny to that Being who broke open the great fountains of the deep to effect the deluge—and afterwards, to compel the dispersion of mankind to people the globe, directed the confusion of languages—powers inferior in their nature to these. After these

wondrous

America. wondrous proofs of Omnipotency, it will be absurd to deny the possibility of infusing instinct into the brute creation. *Deus est anima brutorum*; "God himself is the soul of brutes:" His pleasure must have determined their will, and directed several species, and even whole genera, by impulse irresistible, to move by slow progression to their destined regions. But for that, the llama and the pacos might still have inhabited the heights of Armenia and some more neighbouring Alps, instead of labouring to gain the distant Peruvian Andes; the whole genus of armadillos, slow of foot, would never have quitted the torrid zone of the Old World for that of the New; and the whole tribe of monkeys would have gambled together in the forests of India, instead of dividing their residence between the shades of Indostan and the deep forests of the Brasils. Lions and tigers might have infested the hot parts of the New World, as the first do the deserts of Africa, and the last the provinces of Asia; or the pantherine animals of South America might have remained additional scourges with the savage beasts of those ancient continents. The Old World would have been overstocked with animals; the New remained an unanimated waste! or both have contained an equal portion of every beast of the earth. Let it not be objected, that animals bred in a southern climate, after the descent of their parents from the ark, would be unable to bear the frost and snow of the rigorous north, before they reached South America, the place of their final destination. It must be considered, that the migration must have been the work of ages; that in the course of their progress each generation grew hardened to the climate it had reached; and that after their arrival in America, they would again be gradually accustomed to warmer and warmer climates, in their removal from north to south, as they had in the reverse, or from south to north. Part of the tigers still inhabit the eternal snows of Ararat, and multitudes of the very same species live, but with exalted rage, beneath the line, in the burning soil of Borneo or Sumatra; but neither lions or tigers ever migrated into the New World. A few of the first are found in India and Persia, but they are found in numbers only in Africa. The tiger extends as far north as western Tartary, in lat. 40. 50, but never has reached Africa."

In fine, the conjectures of the learned respecting the vicinity of the Old and New, are now, by the discoveries of our great navigators, lost in conviction; and, in the place of imaginary hypotheses, the real place of migration is uncontrovertibly pointed out. Some (from a passage in Plato) have extended over the Atlantic, from the straits of Gibraltar to the coast of North and South America, an island equal in size to the continents of Asia and Africa; over which had passed, as over a bridge, from the latter, men and animals; wool-headed negroes, and lions and tigers, none of which ever existed in the New World. A mighty sea arose, and in one day and night engulfed this stupendous tract, and with it every being which had not completed its migration into America. The whole negro race, and almost every quadruped, now inhabitants of Africa, perished in this critical day. Five only are to be found at present in America; and of these only one, the bear, in South America: Not a single custom, common to the natives of Africa and

VOL. I. Part II.

America. to evince a common origin. Of the quadrupeds, the bear, stag, wolf, fox, and weasel, are the only animals which we can pronounce with certainty to be found on each continent. The stag, fox, and weasel, have made also no farther progress in Africa than the north; but on the same continent the wolf is spread over every part, yet is unknown in South America, as are the fox and weasel. In Africa and South America the bear is very local, being met with only in the north of the first, and on the Andes in the last. Some cause unknown arrested its progress in Africa, and impelled the migration of a few into the Chilian Alps, and induced them to leave unoccupied the vast tract from North America to the lofty Cordilleras.

Allusions have often been made to some remains on the continent of America, of a more polished and cultivated people, when compared with the tribes which possessed it on its first discovery by Europeans. Mr Barton, in his *Observations on some parts of Natural History*, Part I. has collected the scattered hints of Kalm, Carver, and some others, and has added a plan of a regular work, which has been discovered on the banks of the Muskingum, near its junction with the Ohio. These remains are principally stone-walls, large mounds of earth, and a combination of these mounds with the walls, suspected to have been fortifications. In some places the ditches and the fortrefs are said to have been plainly seen; in others, furrows, as if the land had been ploughed.

The mounds of earth are of two kinds: they are artificial tumuli, designed as repositories for the dead; or they are of a greater size, for the purpose of defending the adjacent country; and with this view they are artificially constructed, or advantage is taken of the natural eminences, to raise them into a fortification.

The remains near the banks of the Muskingum, are situated about one mile above the junction of that river with the Ohio, and 160 miles below Fort Pitt. They consist of a number of walls and other elevations, of ditches, &c. altogether occupying a space of ground about 300 perches in length, and from about 150 to 25 or 20 in breadth. The town, as it has been called, is a large level, encompassed by walls, nearly in the form of a square, the sides of which are from 96 to 86 perches in length. These walls are, in general, about 10 feet in height above the level on which they stand, and about 20 feet in diameter at the base, but at the top they are much narrower; they are at present overgrown with vegetables of different kinds, and, among others, with trees of several feet diameter. The chafms, or openings in the walls, were probably intended for gate-ways: they are three in number at each side, besides the smaller openings in the angles. Within the walls there are three elevations, each about six feet in height, with regular ascents to them: these elevations considerably resemble some of the eminences already mentioned, which have been discovered near the river Mississippi. This author's opinion is, That the Tolticas, or some other Mexican nation, were the people to whom the mounds and fortifications, which he has described, owe their existence; and that those people were probably the descendants of the Danes. The former part of this conjecture is thought probable, from the similarity of the Mexican mounds

114

Remains
of antiqui-
ty in Ame-
rica.

4.C

and

America. and fortifications described by the Abbé Clavigero, and other authors, to those described by our author; and from the tradition of the Mexicans, that they come from the north-west: for, if we can rely on the testimony of late travellers, fortifications similar to those mentioned by Mr Barton have been discovered as far to the north as Lake Pepin; and we find them, as we approach to the south, even as low as the coasts of Florida. The second part of our author's conjecture appears not so well supported.

115
The ancients supposed to have had some imperfect notion of a new world.

It is believed by many, that the ancients had some imperfect notion of a new world; and several ancient authors are quoted in confirmation of this. In a book ascribed to the philosopher Aristotle, we are told that the Carthaginians discovered an island far beyond the pillars of Hercules, large, fertile, and finely watered with navigable rivers, but uninhabited. This island was distant a few days sailing from the continent; its beauty induced the discoverers to settle there: but the policy of Carthage dislodged the colony, and laid strict prohibition on all the subjects of the state not to attempt any future establishment. This account is also confirmed by an historian of no mean credit, who relates, that the Tyrians would have settled a colony on the new-discovered island, but were opposed by the Carthaginians for state reasons. The following passage has also been quoted from Seneca's *Medea*, in confirmation of this notion.

—*Venient annis
Secula feris, quibus oceanus
Vincula rerum laxet, & ingens
Pateat tellus, Typhisque novus
Delegat orbes; nec sit terris
Ultima Thule.*—

ACT. iii. ver. 375.

116
Pretensions of the Welsh to the discovery of America in the 12th century.

Other authors are also quoted in support of this belief. But however this may be, nobody ever believed the existence of this continent so firmly as to go in quest of it; at least, there are no accounts well supported that America received any part of its first inhabitants from Europe prior to the 15th century. The Welsh fondly imagine that our country contributed, in 1170, to people the New World, by the adventure of Madoc, son of Owen Gwynedd, who, on the death of his father, failed there, and colonized part of the country. All that is advanced in proof is, a quotation from one of our poets, which proves no more than that he had distinguished himself by sea and land. It is pretended that he made two voyages: that sailing west, he left Ireland so far to the north, that he came to a land unknown, where he saw many strange things; that he returned home, and, making a report of the fruitfulness of the new-discovered country, prevailed on numbers of the Welsh of each sex to accompany him on a second voyage, from which he never returned. The favourers of this opinion assert, that several Welsh words, such as *gwrando*, "to hearken or listen;" the *isle of Groeso*, or "welcome;" *Cape Breton*, from the name of our own island; *gwynndwr* or "the white water;" and *pengwin*, or "the bird with a white head;" are to be found in the American language. But likeness of sound in a few words will not be deemed sufficient to establish the fact; especially if the meaning has been evidently perverted: for example, the whole penguin

tribe have unfortunately not only black heads, but are not inhabitants of the northern hemisphere; the name was also bestowed on them by the Dutch, *à pinguedine*, from their excessive fatness: but the inventor of this, thinking to do honour to our country, inconsiderately caught at a word of European origin, and unheard of in the New World. It may be added, that the Welsh were never a naval people; that the age in which Madoc lived was peculiarly ignorant in navigation; and the most which they could have attempted must have been a mere coasting voyage.

The Norwegians put in for a share of the glory, on grounds rather better than the Welsh. By their settlements in Iceland and in Greenland, they had arrived within so small a distance of the New World, that there is at least a possibility of its having been touched at by a people so versed in maritime affairs, and so adventurous, as the ancient Nortmans were. The proofs are much more numerous than those produced by the British historians; for the discovery is mentioned in several of the Icelandic manuscripts. The period was about the year 1002, when it was visited by one Biorn; and the discovery pursued to greater effect by Leif, the son of Eric, the discoverer of Greenland. It does not appear that they reached farther than Labrador; on which coast they met with Esquimaux, on whom they bestowed the name of *Skrælingues*, or dwarfish people, from their small stature. They were armed with bows and arrows, and had leathern canoes, such as they have at present. All this is probable; nor should the tale of the German, called *Turkil*, one of the crew, invalidate the account. He was one day missing; but soon returned, leaping and singing with all the extravagant marks of joy a *bon vivant* could show, on discovering the inebriating fruit of his country, the grape: Torfæus even says, that he returned in a state of intoxication. To convince his commander, he brought several bunches, who from that circumstance named the country *Vinland*. It is not to be denied that North America produces the true vine; but it is found in far lower latitudes than our adventurers could reach in the time employed in their voyage, which was comprehended in a very small space. There appears no reason to doubt of the discovery; but as the land was never colonized, nor any advantages made of it, it may be fairly conjectured, that they reached no farther than the barren country of Labrador. In short, it is from a much later period that we must date the real discovery of America.

Towards the close of the 14th century, Venice and Genoa being rivals in commerce, in which the former had greatly the superiority, Christopher Columbus, a native of Genoa, whose knowledge of the true figure of the earth, however attained, was much superior to the general notions of the age in which he lived, conceived a project of sailing to the East Indies by directing his course westward. This design was founded upon a mistake of the geographers of those days, who placed the eastern parts of Asia immensely too far to the eastward; so that had they been in the right, the shortest way would have been to sail directly westward. He applied first to his own countrymen; but being rejected by them, he applied to France, where he was laughed at and ridiculed. He next applied to Henry VII. of England; but meeting with a disappointment there, he

117
Those of the Norwegians better founded.

118
The projects of Christopher Columbus.

America. he made an application to Portugal, where he met with the same mortifying reception. Spain was his next resource; where, after eight years attendance, he obtained, in 1492, a fleet of three ships. The largest, a ship of no considerable burden, was commanded by Columbus as admiral, who gave it the name of *Santa Maria*, out of respect for the blessed Virgin, whom he honoured with singular devotion. Of the second, called the *Pinta*, Martin Pinzon was captain, and his brother Francis pilot. The third, named the *Nigna*, was under the command of Vincent Yanez Pinzon. These two were light vessels, hardly superior in burden or force to large boats. This squadron, if it merits that name, was victualled for 12 months, and had on board 90 men, mostly sailors, together with a few adventurers who followed the fortune of Columbus, and some gentlemen of Isabella's court, whom she appointed to accompany him. Though the expence of the undertaking was one of the circumstances which chiefly alarmed the court of Spain, and retarded so long the negociation with Columbus, the sum employed in fitting out this squadron did not exceed 4000*l*. But as Columbus was deeply impressed with sentiments of religion, he would not set out upon an expedition so arduous, and of which one great object was to extend the knowledge of the Christian faith, without imploring publicly the guidance and protection of Heaven. With this view, he, together with all the persons under his command, marched in solemn procession to the monastery of Rabida. After confessing their sins, and obtaining absolution, they received the holy sacrament from the hands of the guardian, who joined his prayers to theirs for the success of an enterprise which he had so zealously patronized.

119 His voyage. Next morning, being Friday the third day of August in the year 1492, Columbus set sail, a little before sun-rise, in presence of a vast crowd of spectators, who sent up their supplications to Heaven for the prosperous issue of the voyage, which they wished, rather than expected. Columbus steered directly for the Canary islands, and arrived there without any occurrence that would have deserved notice on any other occasion: but in a voyage of such expectation and importance, every circumstance was the object of attention. The rudder of the *Pinta* broke loose the day after she left the harbour, and that accident alarmed the crew, no less superstitious than unskilful, as a certain omen of the unfortunate destiny of the expedition. Even in the short run to the Canaries, the ships were found to be so crazy and ill appointed, as to be very improper for a navigation which was expected to be both long and dangerous. Columbus refitted them, however, to the best of his power; and having supplied himself with fresh provisions, he took his departure from Gomera, one of the most westerly of the Canary islands, on the sixth day of September.

Here the voyage of discovery may properly be said to begin; for Columbus, holding his course due west, left immediately the usual track of navigation, and stretched into unfrequented and unknown seas. The first day, as it was very calm, he made but little way; but on the second, he lost sight of the Canaries; and many of the sailors, dejected already and dismayed, when they contemplated the boldness of the undertaking, began to beat their breasts, and to shed tears, as

if they were never more to behold land. Columbus comforted them with assurances of success, and the prospect of vast wealth, in those opulent regions whither he was conducting them. He regulated every thing by his sole authority; he superintended the execution of every order; and allowing himself only a few hours for sleep, he was at all other times upon deck. As his course lay through seas which had not formerly been visited, the sounding-line, or instruments for observation, were continually in his hands. After the example of the Portuguese discoverers, he attended to the motion of tides and currents, watched the flight of birds, the appearance of fishes, of sea-weeds, and of every thing that floated on the waves, and entered every occurrence, with a minute exactness in the journal which he kept. As the length of the voyage could not fail of alarming sailors habituated only to short excursions, Columbus endeavoured to conceal from them the real progress which they made. With this view, though they run 18 leagues on the second day after they left Gomera, he gave out that they had advanced only 15, and he uniformly employed the same artifice of reckoning short during the whole voyage. By the 14th of September, the fleet was above 200 leagues to the west of the Canary isles, at a greater distance from land than any Spaniard had been before that time. There they were struck with an appearance no less astonishing than new. They observed that the magnetic needle, in their compasses, did not point exactly to the polar star, but varied towards the west; and as they proceeded, this variation increased. This appearance, which is now familiar, though it still remains one of the mysteries of nature, into the cause of which the sagacity of man hath not been able to penetrate, filled the companions of Columbus with terror. They were now in a boundless unknown ocean, far from the usual course of navigation; nature itself seemed to be altered, and the only guide which they had left was about to fail them. Columbus, with no less quickness than ingenuity, invented a reason for this appearance, which, though it did not satisfy himself, seemed so plausible to them, that it dispelled their fears, or silenced their murmurs.

He still continued to steer due west, nearly in the same latitude with the Canary islands. In this course he came within the sphere of the trade-wind, which blows invariably from east to west, between the tropics and a few degrees beyond them. He advanced before this steady gale with such uniform rapidity, that it was seldom necessary to shift a sail. When about 400 leagues to the west of the Canaries, he found the sea so covered with weeds, that it resembled a meadow of vast extent; and in some places they were so thick, as to retard the motion of the vessels. This strange appearance occasioned new alarm and disquiet. The sailors imagined that they were now arrived at the utmost boundary of the navigable ocean; that these floating weeds would obstruct their farther progress, and concealed dangerous rocks, or some large tract of land, which had sunk, they knew not how, in that place. Columbus endeavoured to persuade them, that what had alarmed, ought rather to have encouraged them, and was to be considered as a sign of approaching land. At the same time, a brisk gale arose, and carried them forward. Several birds were seen hovering about the ship,

120
Astonish-
ment occa-
sioned by
observing
the varia-
tion of the
compass.

America and directed their flight towards the west. The desponding crew resumed some degree of spirit, and began to entertain fresh hopes.

Upon the first of October they were, according to the admiral's reckoning, 770 leagues to the west of the Canaries; but lest his men should be intimidated by the prodigious length of the navigation, he gave out that they had proceeded only 584 leagues; and, fortunately for Columbus, neither his own pilot, nor those of the other ships, had skill sufficient to correct this error, and discover the deceit. They had now been above three weeks at sea; they had proceeded far beyond what former navigators had attempted or deemed possible; all their prognostics of discovery, drawn from the flight of birds and other circumstances, had proved fallacious; the appearance of land, with which their own credulity or the artifice of their commander had from time to time flattered and amused them, had been altogether illusive, and their prospect of success seemed now to be as distant as ever. These reflections occurred often to men, who had no other object or occupation, than to reason and discourse concerning the intention and circumstances of their expedition. They made impression at first upon the ignorant and timid, and extending by degrees to such as were better informed or more resolute, the contagion spread at length from ship to ship. From secret whispers or murmurings, they proceeded to open cabals and public complaints. They taxed their sovereign with inconsiderate credulity, in paying such regard to the vain promises and rash conjectures of an indigent foreigner, as to hazard the lives of so many of her own subjects, in prosecuting a chimerical scheme. They affirmed that they had fully performed their duty, by venturing so far in an unknown and hopeless course, and could incur no blame, for refusing to follow, any longer, a desperate adventurer to certain destruction. They contended, that it was necessary to think of returning to Spain, while their crazy vessels were still in a condition to keep the sea, but expressed their fears that the attempt would prove vain, as the wind, which had hitherto been so favourable to their course, must render it impossible to sail in the opposite direction. All agreed that Columbus should be compelled by force to adopt a measure on which their common safety depended. Some of the more audacious proposed, as the most expeditious and certain method for getting rid at once of his remonstrances, to throw him into the sea; being persuaded that, upon their return to Spain, the death of an unsuccessful projector would excite little concern, and be inquired into with no curiosity.

121
Perilous situation of Columbus

Columbus was fully sensible of his perilous situation. He had observed, with great uneasiness, the fatal operation of ignorance and of fear in producing disaffection among his crew; and saw that it was now ready to burst out into open mutiny. He retained, however, perfect presence of mind. He affected to seem ignorant of their machinations. Notwithstanding the agitation and solicitude of his own mind, he appeared with a cheerful countenance; like a man satisfied with the progress which he had made, and confident of success. Sometimes he employed all the arts of insinuation to soothe his men. Sometimes he endeavoured to work upon their ambition or avarice, by magnificent descriptions of the fame and wealth which they were

about to acquire. On other occasions, he assumed a tone of authority, and threatened them with vengeance from their sovereign, if, by their dastardly behaviour, they should defeat this noble effort to promote the glory of God, and to exalt the Spanish name above that of every other nation. Even with seditious sailors, the words of a man whom they had been accustomed to reverence were weighty and persuasive; and not only restrained them from those violent excesses which they meditated, but prevailed with them to accompany their admiral for some time longer.

As they proceeded, the indications of approaching land seemed to be more certain, and excited hope in proportion. The birds began to appear in flocks, making towards the south-west. Columbus, in imitation of the Portuguese navigators, who had been guided in several of their discoveries by the motion of birds, altered his course from due west towards that quarter whither they pointed their flight. But after holding on for several days in this new direction without any better success than formerly, having seen no object during 30 days but the sea and the sky, the hopes of his companions subsided faster than they had risen; their fears revived with additional force; impatience, rage, and despair, appeared in every countenance. All sense of subordination was lost. The officers, who had hitherto concurred with Columbus in opinion, and supported his authority, now took part with the private men: they assembled tumultuously on the deck, expostulated with their commander, mingled threats with their expostulations, and required him instantly to tack about and to return to Europe. Columbus perceived that it would be of no avail to have recourse to any of his former arts, which having been tried so often had lost their effect; and that it was impossible to rekindle any zeal for the success of the expedition among men in whose breasts fear had extinguished every generous sentiment. He saw that it was no less vain to think of employing either gentle or severe measures, to quell a mutiny so general and so violent. It was necessary, on all these accounts, to soothe the passions which he could no longer command, and to give way to a torrent too impetuous to be checked. He promised solemnly to his men that he would comply with their request, provided they would accompany him, and obey his commands for three days longer; and if, during that time, land were not discovered, he would then abandon the enterprise, and direct his course towards Spain.

Enraged as the sailors were, and impatient to turn their faces again towards their native country, this proposition did not appear to them unreasonable. Nor did Columbus hazard much in confining himself to a term so short. The presages of discovering land were now so numerous and promising, that he deemed them infallible. For some days the sounding-line reached the bottom, and the soil which it brought up indicated land to be at no great distance. The flocks of birds increased; and were composed not only of sea fowl, but of such land birds as could not be supposed to fly far from the shore. The crew of the *Pinta* observed a cane floating which seemed to be newly cut, and likewise a piece of timber artificially carved. The sailors aboard the *Nigna* took up the branch of a tree with red berries perfectly fresh. The clouds around the setting sun assumed a new appearance; the air was

more

America. more mild and warm; and, during night, the wind became unequal and variable. From all these symptoms, Columbus was so confident of being near land, that on the evening of the 11th of October, after public prayers for success, he ordered the sails to be furled, and the ships to lie by, keeping strict watch, lest they should be driven ashore in the night. During this interval of suspense and expectation, no man shut his eyes, all kept upon deck, gazing intently towards that quarter where they expected to discover the land which had been so long the object of their wishes.

123
Their joy
on descri-
ing coast.

About two hours before midnight, Columbus standing on the fore-castle, observed a light at a distance, and privately pointed it out to Pedro Gutierrez, a page of the queen's wardrobe. Gutierrez perceived it; and calling to Salcedo comptroller of the fleet, all three saw it in motion, as if it were carried from place to place. A little after midnight, the joyful sound of *Land! land!* was heard from the Pinta, which kept always a-head of the other ships. But having been so often deceived by fallacious appearances, every man was now become slow of belief; and waited, in all the anguish of uncertainty and impatience, for the return of day. As soon as morning dawned, all doubts and fears were dispelled. From every ship an island was seen about two leagues to the north, whose flat and verdant fields, well stored with wood, and watered with many rivulets, presented the aspect of a delightful country. The crew of the Pinta instantly began the *Te Deum*, as a hymn of thanksgiving to God; and were joined by those of the other ships, with tears of joy and transports of congratulation. This office of gratitude to Heaven was followed by an act of justice to their commander. They threw themselves at the feet of Columbus, with feelings of self-condemnation mingled with reverence. They implored him to pardon their ignorance, incredulity, and insolence, which had created him so much unnecessary disquiet, and had so often obstructed the prosecution of his well-concerted plan; and passing, in the warmth of their admiration, from one extreme to another, they now pronounced the man whom they had so lately reviled and threatened, to be a person inspired by Heaven with sagacity and fortitude more than human, in order to accomplish a design so far beyond the ideas and conception of all former ages.

124
They land
in one of
the islands
of the New
World.

As soon as the sun arose, all their boats were manned and armed. They rowed towards the island with their colours displayed, with warlike music, and other martial pomp. As they approached the coast, they saw it covered with a multitude of people, whom the novelty of the spectacle had drawn together, whose attitudes and gestures expressed wonder and astonishment at the strange objects which presented themselves to their view. Columbus was the first European who set foot in the New World which he had discovered. He landed in a rich dress, and with a naked sword in his hand. His men followed; and, kneeling down, they all kissed the ground which they had so long desired to see. They next erected a crucifix; and, prostrating themselves before it, returned thanks to God for conducting their voyage to such an happy issue.

The above was one of the Bahama islands; to which he gave the name of *San Salvador*, and took possession of it in the name of their Catholic majesties. In this

first voyage he discovered several other of the Lucayo or Bahama islands, with those of Cuba and Hispaniola. The natives considered the Spaniards as divinities, and the discharge of the artillery as their thunder: they fell prostrate at the sound. The women, however, offered their favours, and courted the embraces of their new guests as men. Their husbands were not jealous of them; and in the arms of those wantons the companions of Columbus are said to have caught that malady which directs its poison to the springs of life. In a second voyage many new islands were discovered. In a third, he attained the great object of his ambition, by discovering the continent of America, near the mouth of the river Oroonoko, on the first day of August 1498. His success produced a crowd of adventurers from all nations; but the year before this, the northern continent had been discovered by Sebastian Cabot in the service of Henry VII. of England.

Notwithstanding the many settlements of the Europeans in this continent, great part of America remains still unknown. The northern continent contains the British colonies of Hudson's Bay, Canada, Nova Scotia, New England, New York, New Jersey, Pennsylvania, Maryland, Virginia, North and South Carolina, Georgia, East and West Florida. It contains also the Spanish territories of Louisiana, New Mexico, California, and Mexico. Besides these, there are immense regions to the west and north, the boundaries of which have never yet been discovered. In such as are in any degree known, dwell the Esquimaux, the Algonquins, the Hurons, the Iroquois, the Cherokees, the Chickasaws, and many other tribes of Indians. In the southern continent lie the Spanish provinces of Terra Firma, Guiana, Peru, Paraguay, and Chili; together with that of Brazil, belonging to the Portuguese; and the country of Surinam, belonging to the Dutch. Vast tracts, however, in the inland parts, are unknown, being comprehended under the general name of *Amazonia*. A large district also, said to be the residence of a gigantic race of men, lies on the east side of the continent, between the straits of Magellan and the province of Paraguay. See **PATAGONIA**.

This vast country produces most of the metals, minerals, plants, fruits, trees, and wood, to be met with in the other parts of the world, and many of them in greater quantities and high perfection. The gold and silver of America have supplied Europe with such immense quantities of those valuable metals, that they are become vastly more common; so that the gold and silver of Europe now bears little proportion to the high price set upon them before the discovery of America.

It also produces diamonds, pearls, emeralds, amethysts, and other valuable stones, which, by being brought into Europe, have contributed likewise to lower their value. To these, which are chiefly the production of Spanish America, may be added a great number of other commodities, which, though of less price, are of much greater use; and many of them make the ornament and wealth of the British empire in this part of the world. Of these are the plentiful supplies of cochineal, indigo, anatto, logwood, brazil, fustic, pimento, lignum vitæ, rice, ginger, cocoa, or the chocolate nut, sugar, cotton, tobacco, banillas, red-wood, the balsams of Tolu, Peru, and Chili, that valuable

125
The conti-
nent after-
wards dis-
covered.

126
Division of
America.

127
Its produc-
tions.

America. valuable article in medicine the Jesuit's bark, mechoacan, sassafras, sarsaparilla, cassia, tamarinds, hides, furs, ambergris, and a great variety of woods, roots, and plants; to which, before the discovery of America, we were either entire strangers, or forced to buy at an extravagant rate from Asia and Africa, through the hands of the Venetians and Genoese, who then engrossed the trade of the eastern world.

On this continent there grows also a variety of excellent fruits; as pine-apples, pomegranates, citrons, lemons, oranges, malicats, cherries, pears, apples, figs, grapes, great numbers of culinary, medicinal, and other herbs, roots, and plants, with many exotic productions which are nourished in as great perfection as in their native soil.

128. **The different possessors of America.** Altho' the Indians still live in the quiet possession of many large tracts, America, so far as known, is chiefly claimed, and divided into colonies, by three European nations, the Spaniards, English, and Portuguese. The Spaniards, as they first discovered it, have the largest and richest portion, extending from New Mexico and Louisiana in North America, to the Straits of Magellan in the South Sea, excepting the large province of Brasil, which belongs to Portugal; for though the French and Dutch have some forts upon Surinam and Guiana, they scarcely deserve to be considered as proprietors of any part of the southern continent.

Next to Spain, the most considerable proprietor of America was great Britain, who derived her claim to North America from the first discovery of that continent by Sebastian Cabot in the name of Henry VII. *anno* 1497; about six years after the discovery of South America by Columbus in the name of the king of Spain. This country was in general called *Newfoundland*; a name which is now appropriated solely to an island upon its coast. It was a long time before we made an attempt to settle in this country. Sir Walter Raleigh, an uncommon genius and a brave commander, first showed the way, by planting a colony in the southern part, which he called *Virginia*, in honour of his mistress Queen Elizabeth.

129. **Vast extent of the British possessions before the late revolution.** The French indeed, from this period until the conclusion of the war before last, laid a claim to, and actually possessed, Canada and Louisiana; comprehending all that extensive inland country reaching from Hudson's Bay on the north, to Mexico and the gulph of the same name on the south. But in that war, to which their perfidy and ambition gave rise, they were not only driven from Canada and its dependencies, but obliged to relinquish all that part of Louisiana lying on the east side of the Mississippi, as related under the *History of Britain*. And thus our colonies were preserved, secured, and extended so far, as to render it difficult to ascertain the precise bounds of our empire in North America. To the northward we might have extended our claims quite to the pole itself, nor did any nation seem inclined to dispute the property of this northernmost country with us. From that extremity we had a territory extending southward to Cape Florida in the Gulph of Mexico, N. Lat. 25°, and consequently near 4000 miles long in a direct line. And to the westward, our boundaries reached to nations unknown even to the Indians of Canada.

Of the revolution that has since taken place, by which a great part of those territories have been torn

from the British empire, the history follows in the next **America** article.

AMERICA (United States of). Of the rise and establishment of this republic, which has given a new face to the western world, a succinct and impartial narrative shall in this article be attempted; in which, however, we cannot hope entirely to avoid errors, as they are perhaps unavoidable. The accounts from which the historian must derive his information are not yet cleared from the mistakes of prejudice and the fabrications of party; when they differ, their comparative authenticity is with difficulty ascertained; and they want above all that softening which they can receive from time alone.

The beginning of every political establishment is contemptible. Some few banditti taking refuge among the marshes on the banks of the Tiber, laid the foundation of the Roman empire. The turbulence of some North Americans, and the blunders of some British statesmen, gave birth to this new republic, which at a future period, it has been fancied, may perhaps surpass even the splendor of Rome.

131. The state of the British colonies at the conclusion of the war in 1763, was such as attracted the attention of all the politicians in Europe. Their flourishing condition at that period was remarkable and striking: their trade had prospered in the midst of all the difficulties and distresses of a war in which they were so nearly and so immediately concerned. Their population continued on the increase, notwithstanding the ravages and depredations that had been so fiercely carried on by the French, and the native Indians in their alliance. They abounded with spirited and active individuals of all denominations. They were flushed with the uncommon prosperity that had attended them in their commercial affairs and military transactions. Hence they were ready for all kind of undertakings, and saw no limits to their hopes and expectations.

As they entertained the highest opinion of their value and importance, and of the immense benefit that Britain derived from its connection with them, their notions were adequately high in their own favour. They deemed themselves, not without reason, intitled to every kindness and indulgence which the mother-country could bestow.

Although their pretensions did not amount to a perfect equality of advantages and privileges in matters of commerce, yet in those of government they thought themselves fully competent to the task of conducting their domestic concerns with little or no interference from abroad. Though willing to admit the supremacy of Great Britain, they viewed it with a suspicious eye, and with a marked desire and intent speedily to give it limitations.

Their improvements in all the necessary and useful arts did honour to their industry and ingenuity. Tho' they did not live in the luxury of Europe, they had all the solid and substantial enjoyments of life, and were not unacquainted with many of its elegancies and refinements.

A circumstance much to their praise is, that notwithstanding their peculiar addiction to those occupations of which lucre is the sole object, they were duly attentive to cultivate the field of learning; and they have ever since their first foundation been particularly careful to provide for the education of the rising progeny.

Their

America. Their vast augmentation of internal trade and external commerce, was not merely owing to their position and facility of communication with other parts; it arose also from their natural turn and temper, full of schemes and projects; ever aiming at new discoveries, and continually employed in the search of means of improving their condition.

Their condition carried them into every quarter from whence profit could be derived. There was scarcely any port of the American hemisphere to which they had not extended their navigation. They were continually exploring new sources of trade, and were found in every spot where business could be transacted.

To this extensive and incessant application to commerce, they added an equal vigilance in the administration of their affairs at home. Whatever could conduce the amelioration of the soil they possessed, to the progress of agriculture, or to the improvement of their domestic circumstances, was attended to with so much labour and care, that it may be strictly said, that Nature had given them nothing of which they did not make the most.

In the midst of this solicitude and toil in matters of business, the affairs of government were conducted with a steadiness, prudence, and lenity, seldom experienced, and never exceeded, in the best regulated countries of Europe.

Such was the situation of the British colonies in general throughout North America, and of the New England provinces in particular, when the pacification above mentioned opened one of the most remarkable scenes that ever commanded the attention of the world.

132
Intrigues
of the
French.

The French, who have for many ages been the profest and natural enemies of Britain, had long viewed, with equal envy and apprehension, the flourishing state of those colonies she had founded in North America. No doubt at present subsists, that they began immediately after the peace of Paris to carry into execution the scheme they had formed for the separation of the British colonies from the mother-country.

Conscious that, whilst a good understanding lasted between them, the superiority must henceforth remain for ever on the side of Britain, it was only by their disunion that France could hope to regain the station and consequence she had formerly possessed in Europe.

The first steps she took were to employ her secret emissaries in spreading dissatisfaction among the British colonists; and the effects produced by her machinations were precisely such as they had intended and expected. The disposition of the inhabitants of North America began gradually to alter from that warmth of attachment to the mother-country which had so peculiarly characterised them. They began to view her rather in the light of a sovereign than of a parent; and to examine, with a scrupulous nicety, the nature of those ties that rendered them parts of her empire.

133
Taxes laid
on goods
imported
into the
colonies,
and other
obnoxious
acts framed;

In March 1764, a bill was passed, by which heavy duties were laid on goods imported by the colonists from such West India islands as did not belong to Great Britain; at the same time that these duties were to be paid into the exchequer in specie: and in the same session, another bill was framed to restrain the currency of paper-money in the colonies themselves. These acts coming so close upon each other, threw the whole continent into the utmost ferment. Vehement remonstran-

ces were made to the ministry, and every argument made use of that reason or ingenuity could suggest, but to no purpose. Their reasoning, however, convinced a great number of people at home; and thus the American cause came to be considered as the cause of liberty.

America.
134
Which ex-
asperate
the Ameri-
cans.

The Americans, finding all argumentation vain, at last united in an agreement to import no more of the manufactures of Great Britain, but to encourage to the utmost of their power every thing of that kind among themselves. Thus the British manufacturers also became a party against ministry, and did not fail to express their resentment in the strongest terms; but the ministry were not to be so easily daunted, and therefore proceeded to the last step of their intended plan, which was to lay on stamp duties throughout the continent. Previous to this, indeed, several regulations were passed in favour of the commerce of the colonies; but they had now imbibed such unfavourable sentiments of the British ministry, that they paid very little regard to any thing pretended to be done in their favour; or if these acts made any favourable impression, it was quickly obliterated by the news of the stamp-act. The reason given for this act so exceedingly obnoxious was, that a sum might be raised sufficient for the defence of the colonies against a foreign enemy; but this pretence was so far from giving any satisfaction to the Americans, that it excited their indignation to the utmost degree. They not only asserted that they were abundantly able to defend themselves against any foreign enemy, but denied that the British parliament had any right to tax them at all.

It would be superfluous to enter into any arguments used by the contending parties on this important occasion. It was evident that the matter was not to be decided by argument but by force of arms; and the British ministry, too confident of the authority and power of this country, determined to carry on matters with an high hand, to terrify the colonists into an implicit subjection, or, if that would not do, to compel them to it by force. The stamp-act, after a violent opposition in parliament, was passed, and its reception in America was such as might have been expected. The news, and the act itself, first arrived at Boston, where the bells were muffled and rung a funeral peal. The act was first hawked about the streets with a Death's head affixed to it, and styled the "Folly of England, and the ruin of America;" and afterwards publicly burnt by the enraged populace: The stamps themselves were seized and destroyed, unless brought by men of war, or kept in fortified places; those who were to receive the stamp duties were compelled to resign their offices; and such of the Americans as sided with government on this occasion, had their houses plundered and burnt.

135
The stamp-
act framed.

Though these outrages were committed by the lowest of the multitude, they were first connived at by those of superior rank, and the principles on which they were founded afterwards openly patronized by them; and the doctrine became general and openly avowed, that Britain had no right whatever to tax the colonies without their own consent.

It was now found absolutely necessary either to yield to the Americans, by repealing the obnoxious statutes, or to enforce them by arms. The ferment had diffused itself

136
Received
with uni-
versal in-
dignation
in America.

America. itself universally throughout the colonies. Virginia first, and after that all the rest of the provinces, declared against the right of Britain to lay on taxes in America; and that every attempt to vest others with this power besides the king, or the governor of the province and his general assembly, was illegal, unconstitutional, and unjust. Non-importation agreements were every where entered into; and it was even resolved to prevent the sale of any more British goods after the present year. American manufactures, though dearer, as well as inferior in quality to the British, were universally preferred. An association was entered into against eating of lamb, in order to promote the growth of wool; and the ladies with cheerfulness agreed to renounce the use of every species of ornament manufactured in Britain. Such a general and alarming confederacy determined the ministry to repeal some of the most obnoxious statutes; and to this they were the more inclined by a petition from the first American congress, held at New York in the beginning of October 1765.

137
Repealed.

The stamp-act was therefore repealed, to the universal joy of the Americans, and indeed to the general satisfaction of the English, whose manufactures had begun to suffer very severely in consequence of the American association against them. The disputes on the subject without doors, however, were by no means silenced, but each party continued to argue the case as violently as ever. The celebrated Dr Benjamin Franklin, was, on this occasion, examined before the House of Commons; and his opinion was in substance as follows:

138

Opinion of
Dr Frank-
lin on this
subject.

"That the tax in question was impracticable and ruinous. The very attempt had so far alienated the affection of the colonies, that they behaved in a less friendly manner towards the natives of England than before; considering the whole nation as conspiring against their liberty, and the parliament as willing rather to oppress than to support and assist them. America, in fact, did not stand in any need of British manufactures, having already begun to construct such as might be deemed absolutely necessary, and that with such success, as left no doubt of their arriving in a short time at perfection. The elegancies of dress had already been renounced for manufactures of the American kind, though much inferior; and the bulk of the people, consisting of farmers, were such as could in no way be affected by the want of British commodities, as having every necessary within themselves. Materials of all kinds were to be had in plenty: the wool was fine; flax grew in great abundance, and iron was every where to be met with."

The Doctor also insisted, That "the Americans had been greatly misrepresented; that they had been traduced as void of gratitude and affection to the parent state; than which nothing could be more contrary to truth. In the war of 1755 they had, at their own expence, raised an army of 25,000 men; and in that of 1739, they assisted the British expeditions against South America with several thousand men, and had made many brave exertions against the French in North America. It was said that the war of 1755 had been undertaken in defence of the colonies; but the truth was, that it originated from a contest about the limits between Canada and Nova Scotia, and in defence of the English rights to trade on the Ohio. The Ame-

N^o 15.

ricans, however, would still continue to act with their American usual fidelity; and, were any war to break out in which they had no concern, would show themselves as ready as ever to assist the parent state to the utmost of their power, and would never fail to manifest their readiness in contributing to the emergencies of government, when called to do so in a regular and constitutional manner."

The ministry were conscious, that in repealing this obnoxious act, they yielded to the Americans; and therefore, to support, as they thought, the dignity of Great Britain, it was judged proper to publish a declaratory bill, setting forth the authority of the mother country over her colonies, and her power to bind them by laws and statutes *in all cases whatever*. This much diminished the joy with which the repeal of the stamp-act was received in America. It was considered as a proper reason to enforce any claims equally prejudicial with the stamp-act, which might hereafter be set up; a spirit of jealousy pervaded the whole continent, and a strong party was formed, watchful on every occasion to guard against the supposed encroachments of the British power.

It was not long before an occasion offered, in which the Americans manifested a spirit of absolute independence; and that, instead of being bound by the British legislature in all cases, they would not be controlled by it in the most trivial affairs. The Rockingham ministry had passed an act, providing the troops stationed in different parts of the colonies with such accommodations as were necessary for them. The assembly of New York, however, took upon them to alter the mode of execution prescribed by the act of parliament, and to substitute one of their own. This gave very great offence to the new ministry, and rendered them, though composed of those who had been active against the stamp bill, less favourable to the colonies than in all probability they would have otherwise been. An unlucky circumstance at the same time occurred, which threw every thing once more into confusion. One of the new ministry, Mr Charles Townshend, having declared that he could find a way of taxing the Americans without giving them offence, was called upon to propose his plan. This was by imposing a duty upon tea, paper, painters colours, and glass imported into America. The undutiful behaviour of the New York assembly, and that of Boston, which had proceeded in a similar manner, caused this bill to meet with less opposition than otherwise it might have done. As a punishment to the refractory assemblies, the legislative power was taken from that of New York, until it should fully comply with the terms of the act. That of Boston at last submitted with reluctance. The bill for the new taxes was quickly passed, and sent to America in 1768.

A ferment much greater than that occasioned by the stamp-act now took place throughout the continent. The populace renewed their outrages, and those of superior station entered into regular combinations against it. Circular letters were sent from Massachusetts colony to all the rest, setting forth the injustice and impropriety of the behaviour of the British legislature. Meetings were held in all the principal towns, in which it was proposed to lessen the consumption of foreign manufactures, by giving proper encouragement to their own.

139
Declaratory bill
gives offence in America.

140
Assembly of New York disobeys an act of parliament.

141
Mr Townshend's plan to tax America.

142
Is received there with still greater indignation than even the stamp-act.

¹⁴³ **Quarrel between the people of Massachusetts Bay and their governor.** America. own. Continual disputes ensued betwixt the governors and general assemblies of their provinces, which were much heightened by a letter from Lord Shelburn to governor Bamand of Massachusetts Bay, containing complaints of the people he governed. The assembly, exasperated to the highest degree, charged their governor with having misrepresented them to the court of Britain, required him to produce copies of the letters he had sent; and, on his refusal, wrote letters to the English ministry, accusing him of misrepresentation and partiality, complaining at the same time most grievously of the proceedings of parliament, as utterly subversive of the liberties of America, and the rights of British subjects.

The governor, at a loss how to defend himself, prorogued the assembly; and, in his speech on the occasion, gave a loose to his resentment, accusing the members of ambitious designs, incompatible with those of dutiful and loyal subjects. To counteract the circular letter of the province of Massachusetts Bay, Lord Hillsborough, secretary for the American department, sent another to the governors of the different colonies, reprobating the other as full of misrepresentation, and tending to excite a rebellion against the authority of the parent state.

¹⁴⁴ **Here requires the assembly to rescind their circular letter;** Matters now hastened to a crisis. The governor had been ordered to proceed with vigour, and by no means to show any disposition to yield to the people as formerly. In particular, they were required to rescind that resolution by which they had written the circular letter above mentioned; and, in case of a refusal, it was told them that they would be dissolved. As this letter had been framed by the resolutions of a former House, they desired, after a week's consultation, that a recess might be granted to consult with their constituents; but this being refused, they came to a determination, 92 against 17, to adhere to the resolution which produced the circular letter. At the same time a letter was sent to Lord Hillsborough, and a message to the governor, in justification of their proceedings. In both, they expressed themselves with such freedom as was by no means calculated to accord with the sentiments of those in power. They insisted that they had a right to communicate their sentiments to their fellow-subjects upon matters of such importance; complained of the requisition to rescind the circular letter as unconstitutional and unjust; and particularly insisted, that they were represented as harbouring seditious designs, when they were doing nothing but what was lawful and right. At the same time, they condemned the late acts of parliament as highly oppressive, and subversive of liberty. The whole was concluded by a list of accusations against their governor, representing him as unfit to continue in his station, and petitioning the king for his removal from it.

¹⁴⁵ **Which they refuse.** These proceedings were followed by a violent tumult at Boston. A vessel belonging to a capital trader had been seized in consequence of his having neglected some of the new regulations; and being taken under the protection of a man of war at that time lying in the harbour, the populace attacked the houses of the commissioners of excise, broke their windows, destroyed the collector's boats, and obliged the customhouse-officers to take refuge in Castle William, situated at the entrance of the harbour.

¹⁴⁶ **Accuse their governor, and petition for his removal.**

¹⁴⁷ **A tumult at Boston.**

The governor now took the last step in his power to put a stop to the violent proceedings of his assembly, by dissolving it entirely; but this was of little moment. Their behaviour had been highly approved by the other colonies, who had written letters to them expressive of their approbation. After the dissolution of the assembly, frequent meetings of the people were held in Boston, which ended in a remonstrance to the governor, to the same purpose as some of the former; but concluding with an extraordinary request, that he would take upon him to order the king's ships out of the harbour.

While the disposition of the Bostonians was thus going on from bad to worse, news arrived that the agent for the colony had not been allowed to deliver their petition to the king; it having been objected, that the assembly without the governor was not sufficient authority. This did not contribute to allay the ferment; and it was further augmented by the news that a number of troops had been ordered to repair to Boston, to keep the inhabitants in awe.

A dreadful alarm now took place. The people called on the governor to convene a general assembly, in order to remove their fears of the military; who they said were to be assembled to overthrow their liberties, and force obedience to laws to which they were entirely averse. The governor replied, that it was no longer in his power to call an assembly; having, in his last instructions from England, been required to wait the king's orders, the matter being then under consideration at home. Being thus refused, the people took upon themselves the formation of an assembly, which they called a *convention*. The proceedings and resolutions of this were conformable to their former behaviour; but now they went a step farther, and, under pretence of an approaching rupture with France, ordered the inhabitants to put themselves in a posture of defence against any sudden attack of an enemy; and circular letters were directed to all the towns in the province, acquainting them with the resolutions that had been taken in the capital, and exhorting them to proceed in the same manner. The town of Hatfield alone refused its concurrence; but this served only to expose them to the censure and contempt of the rest. The convention, however, thought proper to assure the governor of their pacific intentions, and renewed their request that an assembly might be called; but being refused any audience, and threatened with being treated as rebels, they at last thought proper to dissolve of themselves, and sent over to Britain a circumstantial account of their proceedings, with the reason of their having assembled in the manner already mentioned.

The expected troops arrived on the very day on which the convention broke up, and had some houses in the town fitted up for their reception. Their arrival had a considerable influence on the people, and for some time seemed to put a stop to the disturbances; but the seeds of discord had now taken such deep root, that it was impossible to quench the flame. The late outrageous behaviour in Boston had given the greatest offence in England; and, notwithstanding all the efforts of opposition, an address from both houses of parliament was presented to the king; in which the audacious behaviour of the colony of Massachusetts Bay against

America. ¹⁴⁸ The assembly dissolved.

¹⁴⁹ The disturbances still increase.

¹⁵⁰ Some troops ordered to Boston.

¹⁵¹ The people form an assembly, called a convention.

¹⁵² Which dissolves, and endeavours to vindicate its own conduct.

¹⁵³ Both houses of parliament address the king against Massachusetts Bay.

America was set forth in the most ample manner, and the most vigorous measures recommended for reducing them to obedience. The Americans, however, continued steadfast in the ideas they had adopted. Though the troops had for some time quieted the disturbances, yet the calm continued no longer than they appeared respectable on account of their number; but as soon as this was diminished by the departure of a large detachment, the remainder were treated with contempt, and it was even resolved to expel them altogether. The country people took up arms for this purpose, and were to have assisted their friends in Boston; but before the plot could be put in execution, an event happened which put an end to every idea of reconciliation betwixt the contending parties.

154 Some people killed by the soldiers in a mob at Boston. On the 5th of March 1770, a scuffle happened between some soldiers and a party of the town's people. The inhabitants poured in from all quarters to the assistance of their fellow-citizens; a violent tumult ensued, during which the military fired among the mob, killing and wounding several of them. The whole province now rose in arms, and the soldiers were obliged to retire to Castle William to prevent their being cut in pieces. In other respects, the determinations of the Americans continued, if possible, more firm than ever, until at last government, determined to act with

155 All the duties excepting that on tea taken off; vigour, and at the same time to behave with as much condescension as possible, repealed all the duties lately laid on, that of tea alone excepted. This was left on purpose to maintain the dignity of the crown of Britain; and it was thought that it could not be productive of any discontent in America, as being an affair of very little moment, the produce of which was not expected to exceed L. 16,000. The opposition, however, were strenuous in their endeavours to get this tax likewise abrogated; insisting, that the Americans would consider it only as an inlet to others; and that the repeal of all the rest, without this, would answer no good purpose. The event showed that their opinion was well founded. The Americans opposed the

156 Which is as violently opposed as all the rest. tea-tax with the same violence as they had done all the opposed as rest: and at last, on the news that salaries had been settled on the justices of the superior court of Boston, the governor was addressed on the subject; the measure was condemned in the strongest terms; and a committee selected out of the several districts of the colony appointed to inquire into it.

157 Assembly of Massachusetts Bay formally denies the British right of taxation. The new assembly proceeded in the most formal manner to disavow the supremacy of the British legislature; accused the parliament of Britain of having violated the natural rights of the Americans in a number of instances. Copies of the transactions of this assembly were transmitted to every town in Massachusetts, exhorting the inhabitants to rouse themselves, and exert every nerve in opposition to the iron hand of oppression, which was daily tearing the choicest fruits from the fair tree of liberty. The disturbances were also greatly

158 Gov. Hutchinson's letters to British ministry discovered. heightened by an accidental discovery that Mr Hutchinson, governor of Massachusetts Bay, had written several confidential letters to people in power in England, complaining of the behaviour of the province, recommending vigorous measures against them, and, among other things, asserting, that "there must be an abridgment of what is called British liberty." Letters of this kind had some how or other fallen in-

to the hands of the agent for the colony at London. America. They were immediately transmitted to Boston, where the assembly was sitting, by whom they were laid before the governor, who was thus reduced to a very mortifying situation. Losing every idea of respect or friendship for him as their governor, they instantly dispatched a petition to the king, requesting him to remove the governor and deputy-governor from their places; but to this they not only received no favourable answer, but the petition itself was declared groundless and scandalous.

159 The petition against him refused. 160 Tea destroyed at Boston. Matters were now ripe for the utmost extremities on the part of the Americans; and they were brought on in the following manner. Though the colonists had entered into a non-importation agreement against tea as well as all other commodities from Britain, it had nevertheless found its way into America, though in smaller quantities than before. This was sensibly felt by the East-India Company, who had now agreed to pay a large sum annually to government; in recompence for which compliance, and to make up their losses in other respects, they were empowered to export their tea from any duty payable in Britain; and in consequence of this permission, several ships freighted with the commodity were sent to North America, and proper agents appointed for disposing of it. The Americans now perceiving that the tax was thus likely to be enforced whether they would or not, determined to take every possible method to prevent the tea from being landed, as well knowing that it would be impossible to hinder the sale should the commodity once be brought on shore. For this purpose the people assembled in great numbers, forcing those to whom the tea was consigned to resign their offices, and to promise solemnly never to resume them; and committees were appointed to examine the accounts of merchants, and make public tests, declaring such as would not take them enemies to their country. Nor was this behaviour confined to the colony of Massachusetts Bay; the rest of the provinces entered into the contest with the same warmth, and manifested the same resolution to oppose the mother country.

In the midst of this confusion three ships laden with tea arrived at Boston; but so much were the captains alarmed at the disposition which seemed to prevail among the people, that they offered, providing they could obtain the proper discharges from the tea-commissioners, customhouse, and governor, to return to Britain without landing their cargoes. The parties concerned, however, though they durst not order the tea to be landed, refused to grant the discharges required. The ships, therefore, would have been obliged to remain in the harbour; but the people, apprehensive that if they remained there the tea would be landed in small quantities, and disposed of in spite of every endeavour to prevent it, resolved to destroy it at once. This resolution was executed with equal speed and secrecy. The very evening after the above-mentioned discharges had been refused, a number of people dressed like Mohawk Indians boarded the ships, and threw into the sea their whole cargoes, consisting of 342 chests of tea; after which they retired without making any further disturbance, or doing any more damage. No tea was destroyed in other places, though the same spirit was every where manifested. At Philadelphia the

America. the pilots were enjoined not to conduct the vessels up the river; and at New York, though the governor caused some tea to be landed under the protection of a man of war, he was obliged to deliver it up to the custody of the people, to prevent its being sold.

161
And refused admittance in other places.

The destruction of the tea at Boston, which happened in November 1773, was the immediate prelude to the disasters attending civil discord. Government finding themselves every where insulted and despised, resolved to enforce their authority by all possible means; and as Boston had been the principal scene of the riots and outrages, it was determined to punish that city in an exemplary manner. Parliament was acquainted by a message from his majesty with the undutiful behaviour of the city of Boston, as well as of all the colonies, recommending at the same time the most vigorous and spirited exertions to reduce them to obedience. The parliament in its address promised a ready compliance; and indeed the Americans, by their outrageous behaviour, had now lost many of their partisans.

162
Punishment of Boston resolved on.

It was proposed to lay a fine on the town of Boston equal to the price of the tea which had been destroyed, and to shut up its port by armed vessels until the refractory spirit of the inhabitants should be subdued; which it was thought must quickly yield, as a total stop would thus be put to their trade. The bill was strongly opposed on the same grounds that the other had been; and it was predicted, that instead of having any tendency to reconcile or subdue the Americans, it would infallibly exasperate them beyond any possibility of reconciliation. The petitions against it, presented by the colony's agent, pointed out the same consequence in the strongest terms, and in the most positive manner declared that the Americans never would submit to it; but such was the infatuation attending every rank and degree of men, that it never was imagined the Americans would dare to resist the parent state openly; but would in the end submit implicitly to her commands.

163
Arguments and petitions against it.

In this confidence a third bill was proposed for the impartial administration of justice on such persons as might be employed in the suppression of riots and tumults in the province of Massachusetts Bay. By this act it was provided, that should any persons acting in that capacity be indicted for murder, and not able to obtain a fair trial in the province, they might be sent by the governor to England, or to some other colony, if necessary, to be tried for the supposed crime.

164
And for the impartial administration of justice.

These three bills having passed so easily, the ministry proposed a fourth, relative to the government of Canada; which, it was said, had not yet been settled on any proper plan. By this bill the extent of that province was greatly enlarged; its affairs were put under the direction of a council in which Roman Catholics were to be admitted; the Roman Catholic clergy were secured in their possessions and the usual perquisites from those of their own profession. The council above mentioned were to be appointed by the crown, to be removeable at its pleasure: and to be invested with every legislative power excepting that of taxation.

165
Quebec bill

No sooner were these laws made known in America, than they cemented the union of the colonies almost beyond any possibility of dissolving it. The assembly of Massachusetts Bay had passed a vote against the

166
These acts exasperate the Americans.

judges accepting salaries from the crown, and put the question, Whether they would accept them as usual from the general assembly? Four answered in the affirmative; but Peter Oliver the chief-justice refused. A petition against him, and an accusation, were brought before the governor; but the latter refused the accusation, and declined to interfere in the matter; but as they still insisted for what they called justice against Mr Oliver, the governor thought proper to put an end to the matter by dissolving the assembly.

In this situation of affairs a new alarm was occasioned by the news of the port-bill. This had been totally unexpected, and was received with the most extravagant expressions of displeasure among the populace; and while these continued, the new governor, General Gage, arrived from England. He had been chosen to this office on account of his being well acquainted in America, and generally agreeable to the people; but human wisdom could not now point out a method by which the flame could be allayed. The first act of his office as governor was to remove the assembly to Salem, a town 17 miles distant, in consequence of the late act. When this was intimated to the assembly, they replied by requesting him to appoint a day of public humiliation for deprecating the wrath of heaven, but met with a refusal. When met at Salem, they passed a resolution, declaring the necessity of a general congress composed of delegates from all the provinces, in order to take the affairs of the colonies at large into consideration; and five gentlemen, remarkable for their opposition to the British measures, were chosen to represent that of Massachusetts Bay. They then proceeded with all expedition to draw up a declaration, containing a detail of the grievances they laboured under, and the necessity of exerting themselves against lawless power; they set forth the disregard shown to their petitions, and the attempts of Great Britain to destroy their ancient constitution; and concluded with exhorting the inhabitants of the colony to obstruct, by every method in their power, such evil designs, recommending at the same time a total renunciation of every thing imported from Great Britain till a redress of grievances could be procured.

America.

167

Resentment occasioned by the port-bill.

Intelligence of this declaration was carried to the governor on the very day that it was completed; on which he dissolved the assembly. This was followed by an address from the inhabitants of Salem in favour of those of Boston, and concluding with these remarkable words: "By shutting up the port of Boston, some imagine that the course of trade might be turned hither, and to our benefit; but nature, in the formation of our harbour, forbids our becoming rivals in commerce with that convenient mart; and were it otherwise, we must be dead to every idea of justice, lost to all feelings of humanity, could we indulge one thought to seize on wealth, and raise our fortunes on the ruin of our suffering neighbours."

168

Proceedings of the general assembly met at Salem.

It had been fondly hoped by the ministerial party at home, that the advantages which other towns of the colony might derive from the annihilation of the trade of Boston would make them readily acquiesce in the measure of shutting up that port, and rather rejoice in it than otherwise; but the words of the address above mentioned seemed to preclude all hope of this kind;

169

Generosity of the people of Salem to those of Boston.

America kind; and subsequent transactions soon manifested it to be totally vain. No sooner did intelligence arrive of the remaining bills passed in the session of 1774, than the cause of Boston became the cause of all the colonies. The port-bill had already occasioned violent commotions throughout them all. It had been reprobated in provincial meetings, and resistance even to the last had been recommended against such oppression.

173
The cause of Boston espoused by all the rest of the colonies.

In Virginia, the first of June, the day on which the port of Boston was to be shut up, was held as a day of humiliation, and a public intercession in favour of America was enjoined. The style of the prayer enjoined at this time was, that "God would give the people one heart and one mind, firmly to oppose every invasion of the American rights." The Virginians, however, did not content themselves with acts of religion. They recommended in the strongest manner a general congress of all the colonies, as fully persuaded that an attempt to tax any colony in an arbitrary manner was in reality an attack upon them all, and must ultimately end in the ruin of them all.

The provinces of New York and Pennsylvania, however, were less sanguine than the rest, being so closely connected in the way of trade with Great Britain, that the giving it up entirely appeared a matter of the most serious magnitude, and not to be thought of but after every other method had failed. The intelligence

171
The Americans firmly united in their opposition to Britain of the remaining bills respecting Boston, however, spread a fresh alarm throughout the continent, and fixed those who had seemed to be the most wavering. The proposal of giving up all commercial intercourse with Britain was again proposed; contributions for the inhabitants of Boston were raised in every quarter; and they every day received addresses commending them for the heroic courage with which they sustained their calamity.

172
Solemn league and covenant formed at Boston. The Bostonians on their part were not wanting in their endeavours to promote the general cause. An agreement was framed, which, in imitation of former times, they called a Solemn League and Covenant. By this the subscribers most religiously bound themselves to break off all communication with Britain after the expiration of the month of August ensuing, until the obnoxious acts were repealed; at the same time they engaged neither to purchase nor use any goods imported after that time, and to renounce all connection with those who did, or who refused to subscribe to this covenant; threatening to publish the names of the refractory, which at this time was a punishment by no means to be despised. Agreements of a similar kind were almost instantaneously entered into throughout all America. General Gage indeed attempted to counteract the covenant by a proclamation, wherein it was declared an illegal and traitorous combination, threatening with the pains of law such as subscribed or countenanced it. But matters were too far gone for his proclamations to have any effect. The Americans retorted the charge of illegality on his own proclamation, and insisted that the law allowed subjects to meet in order to consider of their grievances, and associate for relief from oppression.

173
The governor attempts in vain to counteract it by proclamation. Preparations were now made for holding the general congress so often proposed. Philadelphia, as being the most central and considerable town, was pitch-

ed upon for the place of its meeting. The delegates of whom it was to be composed were chosen by the representatives of each province, and were in number from two to seven for each colony, though no province had more than one vote. The first congress which met at Philadelphia, in the beginning of September 1774, consisted of 51 delegates. The novelty and importance of the meeting excited an universal attention; and their transactions were such as could not but tend to render them respectable.

174
Congress meets at Philadelphia.

The first act of congress was an approbation of the conduct of Massachusetts Bay, and an exhortation to continue in the same spirit with which they had begun. Supplies for the suffering inhabitants (whom indeed the operation of the port-bill had reduced to great distress) were strongly recommended; and it was declared, that in case of attempts to enforce the obnoxious acts by arms, all America should join to assist the town of Boston; and should the inhabitants be obliged, during the course of hostilities, to remove farther up the country, the losses they might sustain should be repaired at the public expence.

175
Account of its transactions.

They next addressed General Gage by letter; in which, having stated the grievances of the people of Massachusetts colony, they informed him of the fixed and unalterable determination of all the other provinces to support their brethren, and to oppose the British acts of parliament; that they themselves were appointed to watch over the liberties of America; and intreated him to desist from military operations, lest such hostilities might be brought on as would frustrate all hopes of reconciliation with the parent state.

The next step was to publish a declaration of their rights. These they summed up in the rights belonging to Englishmen; and particularly insisted, that as their distance rendered it impossible for them to be represented in the British parliament, their provincial assemblies, with the governor appointed by the king, constituted the only legislative power within each province. They would, however, consent to such acts of parliament as were evidently calculated merely for the regulation of commerce, and securing to the parent state the benefits of the American trade; but would never allow that they could impose any tax on the colonies, for the purpose of raising a revenue, without their consent. They proceeded to reprobate the intention of each of the new acts of parliament; and insisted on all the rights they had enumerated as being unalienable, and what none could deprive them of. The Canada act they particularly pointed out as being extremely inimical to the colonies, by whose assistance it had been conquered; and they termed it "An act for establishing the Roman Catholic religion in Canada, abolishing the equitable system of English laws, and establishing a tyranny there." They further declared in favour of a non-importation and non-consumption of British goods until the acts were repealed by which duties were imposed upon tea, coffee, wine, sugar, and molasses, imported into America, as well as the Boston port-act, and the three others passed in the preceding session of parliament. The new regulations against the importation and consumption of British commodities were then drawn up with great solemnity; and they concluded with returning the warm-

est

America est thanks to those members of parliament who had with so much zeal, though without any success, opposed the obnoxious acts of parliament.

Their next proceedings were to frame a petition to the king, an address to the British nation, and another to the colonies; all of which were so much in the usual strain of American language for some time past, that it is needless to enter into any particular account of them. It is sufficient to say that they were all drawn up in a masterly manner, and ought to have impressed the people of this country with a more favourable idea of the Americans than they could at that time be induced to entertain.

All this time the disposition of the people had corresponded with the warmest wishes of congress. The first of June had been kept as a fast, not only throughout Virginia where it was first proposed, but through the whole continent. Contributions for the distressed of Boston had been raised throughout America, and people of all ranks seemed to be particularly touched with them. Even those who seemed to be most likely to derive advantages from them took no opportunity, as has been already instanced in the case of Salem.

176
Generosity of the inhabitants of Marblehead to Boston.

177
Extreme attachment of the country people to the Bostonians.

The inhabitants of Marblehead also showed a noble example of magnanimity in the present case. Though situated in the neighbourhood of Boston, and most likely to derive benefit from their distresses, they did not attempt to take any advantage, but generously offered the use of their harbour to the Bostonians, as well as their wharfs and warehouses, free of all expence. In the mean time the British forces at Boston were continually increasing in number, which greatly augmented the general jealousy and disaffection; the country were ready to rise at a moment's warning; and the experiment was made by giving a false alarm that the communication between the town and country was to be cut off, in order to reduce the former by famine to a compliance with the acts of parliament. On this intelligence the country people assembled in great numbers, and could not be satisfied till they had sent messengers into the city to enquire into the truth of the report. These messengers were enjoined to inform the town's people, that if they should be so pusillanimous as to make a surrender of their liberties, the province would not think itself bound by such examples; and that Britain, by breaking their original charter, had annulled the contract subsisting between them, and left them to act as they thought proper.

The people in every other respect manifested their inflexible determination to adhere to the plan they had so long followed. The new counsellors and judges were obliged to resign their offices, in order to preserve their lives and properties from the fury of the multitude. In some places they shut up the avenues to the court-houses; and when required to make way for the judges, replied, that they knew of none but such as were appointed by the ancient usage and custom of the province. Every where they manifested the most ardent desire of learning the art of war; and every individual who could bear arms, was most assiduous in procuring them, and learning their exercise.

178
Gen. Gage fortifies Boston Neck.

Matters at last proceeded to such an height, that General Gage thought proper to fortify the neck of land which joins the town of Boston to the continent. This, though undoubtedly a prudent measure in his

situation, was exclaimed against by the Americans in the most vehement manner; but the General, instead of giving ear to their remonstrances, deprived them of all power of acting against himself, by seizing the provincial powder, ammunition, and military stores at Cambridge and Charlestown. This excited such indignation, that it was with the utmost difficulty the people could be restrained from marching to Boston and attacking the troops. Even in the town itself, the company of cadets that used to attend him disbanded themselves, and returned the standard he had as usual presented them with on his accession to the government. This was occasioned by his having deprived the celebrated John Hancock, afterwards president of the congress, of his commission as colonel of the cadets. A similar instance happened of a provincial colonel having accepted a seat in the new council; upon which 24 officers of his regiment resigned their commissions in one day.

In the mean time a meeting was held of the principal inhabitants of the towns adjacent to Boston. The purport of this was publicly to renounce all obedience to the late acts of parliament, and to form an engagement to indemnify such as should be prosecuted on that account; the members of the new council were declared violators of the rights of their country; all ranks and degrees were exhorted to learn the use of arms; and the receivers of the public revenue were ordered not to deliver it into the treasury, but retain it in their own hands till the constitution should be restored, or a provincial congress dispose of it otherwise.

A remonstrance against the fortifications on Boston Neck was next prepared; in which, however, they still pretended their unwillingness to proceed to any hostile measures; asserting only as usual their firm determination not to submit to the acts of parliament they had already so much complained of. The governor, to restore tranquillity, if possible, called a general assembly; but so many of the council had resigned their seats, that he was induced to countermand its sitting by proclamation. This measure, however, was deemed illegal; the assembly met at Salem; and after waiting a day for the governor, voted themselves into a provincial congress, of which Mr Hancock was chosen president. A committee was instantly appointed, who waited on the governor with a remonstrance concerning the fortifications on Boston Neck; but nothing of consequence took place, both parties mutually criminating each other. The winter was now coming on, and the governor, to avoid quartering the soldiers upon the inhabitants, proposed to erect barracks for them; but the select men of Boston compelled the workmen to desist. Carpenters were sent for to New York, but they were refused; and it was with the utmost difficulty that he could procure winter-lodgings for his troops. Nor was the difficulty less in procuring clothes; as the merchants of New York told him, that "they would never supply any article for the benefit of men sent as enemies to their country."

This disposition, known to be almost universal throughout the continent, was in the highest degree satisfactory to congress. Every one saw that the ensuing spring was to be the season of commencing hostilities, and the most indefatigable diligence was used by the colonies to be well provided against such a formidable

America
179
And seizes the military stores belonging to the province.

180
Opposition to the British parliament still increases.

181
A general assembly called and dissolved by proclamation.

182
Gen Gage meets with great difficulties in accommodating his troops.

183
The Americans make preparations for war.

America. midable enemy. A list of all the fencible men in each colony was made out, and especially of those who had served in the former war; of whom they had the satisfaction to find that two-thirds were still alive and fit to bear arms. Magazines of arms were collected, and money was provided for the payment of troops. The governors in vain attempted to put a stop to these proceedings by proclamations; the fatal period was now arrived; and the more the servants of government attempted to repress the spirit of the Americans, the more violent it appeared.

184.
Distress of
the inhabi-
tants of
Boston.

In the mean time the inhabitants of Boston were reduced to great distress. The British troops, now distinguished by the name of the *enemy*, were absolutely in possession of it; the inhabitants were kept as prisoners, and might be made accountable for the conduct of the whole colonies; and various measures were contrived to relieve the latter from such a disagreeable situation. Sometimes it was thought expedient to remove the inhabitants altogether; but this was impracticable without the governor's consent. It was then proposed to set fire to the town at once, after valuing the houses and indemnifying the proprietors; but this being found equally impracticable, it was resolved to wait some other opportunity, as the garrison were not very numerous, and, not being supplied with necessaries by the inhabitants, might soon be obliged to leave the place. The friends of British government indeed attempted to do something in opposition to the general voice of the people; but after a few ineffectual meetings and resolutions they were utterly silenced, and obliged to yield to the superior number of their adversaries.

185.
Military
stores seized
by the
Americans.

Matters had now proceeded so far that every idea of reconciliation or friendship with Britain was lost. The Americans, therefore, without ceremony, began to seize on the military stores and ammunition belonging to government. This first commenced at New-port in Rhode Island, where the inhabitants carried off 40 pieces of cannon appointed for the protection of the place; and on being asked the reason of this proceeding, they replied, that the people had seized them lest they should be made use of against themselves. After this the assembly met, and resolved that ammunition and warlike stores should be purchased with the public money.

New-Hampshire followed the example of Rhode Island, and seized a small fort for the sake of the powder and military stores it contained. In Pennsylvania, however, a convention was held, which expressed an earnest desire of reconciliation with the mother-country; though, at the same time, in the strongest manner declaring, that they were resolved to take up arms in defence of their just rights, and defend to the last their opposition to the late acts of parliament; and the people were exhorted to apply themselves with the greatest assiduity to the prosecution of such manufactures as were necessary for their defence and subsistence, such as salt, salt-petre, gunpowder, steel, &c. This was the universal voice of the colonies, New York only excepted. The assembly of that province, as yet ignorant of the fate of their last remonstrance, refused to concur with the other colonies in their determination to throw off the British yoke: their attachment, however, was very faint, and by the event it appeared that

a perseverance in the measures which the ministry had adopted was sufficient to unite them to the rest.

As the disturbances had originated in the province of Massachusetts Bay, and there continued all along with the greatest violence, so this was the province where the first hostilities were formally commenced. In the beginning of February the provincial congress met at Cambridge; and as no friends to Britain could now find admittance to that assembly, the only consideration was how to make proper preparations for war. Expertness in military discipline was recommended in the strongest manner, and several military institutions enacted; among which that of the *minute-men* was one of the most remarkable. These were chosen from the most active and expert among the militia; and their business was to keep themselves in constant readiness at the call of their officers; from which perpetual vigilance they derived their title.—It was now easily seen that a slight occasion would bring on hostilities, which could not but be attended with the most violent and certain destruction to the vanquished party; for both were so much exasperated by a long course of reproaches and literary warfare, that they seemed to be filled with the utmost inveteracy against each other.

On the 26th of February, General Gage having been informed that a number of field-pieces had been brought to Salem, dispatched a party to seize them. Their road was obstructed by a river, over which was a draw-bridge. This the people had pulled up, and refused to let down: upon which the soldiers seized a boat to ferry them over; but the people cut out her bottom. Hostilities would immediately have commenced, had it not been for the interposition of a clergyman, who represented to the military on the one hand, the folly of opposing such numbers; and to the people on the other, that as the day was far spent the military could not execute their design, so that they might without any fear leave them the quiet possession of the draw-bridge. This was complied with; and the soldiers, after having remained for some time at the bridge, returned without executing their orders.

The next attempt, however, was attended with more serious consequences. General Gage, having been informed that a large quantity of ammunition and military stores had been collected at Concord, about 20 miles from Boston, and where the provincial congress was sitting, sent a detachment, under the command of Colonel Smith and Major Pitcairn, to destroy the stores, and, as was reported, to seize Messrs Hancock and Adams, the leading men of the congress. They set out before day-break, on the 19th of April, marching with the utmost silence, and securing every one they met on the road, that they might not be discovered. But notwithstanding all their care, the continual ringing of bells and firing of guns as they went along, soon gave them notice that the country was alarmed. About five in the morning they had reached Lexington, 15 miles from Boston, where the militia of the place were exercising. An officer called out to them to disperse; but some shots, it is said, being at that moment fired from a house in the neighbourhood, the military made a discharge, which killed and wounded several of the militia. The detachment then proceeded to Concord, where, having destroyed the stores, they were encountered by the Americans; and a scuffle ensued, in

186
Massachu-
setts assem-
bly recom-
mend pre-
parations
for war.

187

America in which several fell on both sides. The purpose of their expedition being thus accomplished, it was necessary for the king's troops to retreat, which they did through a continual fire kept upon them from Concord to Lexington. Here their ammunition was totally expended; and they would have been unavoidably cut off, had not a considerable reinforcement commanded by Lord Percy luckily met them. The Americans, however, continued their attack with great fury; and the British would still have been in the utmost danger, had it not been for two field-pieces which Lord Percy had brought with him. By these the impetuosity of the Americans was checked, and the British made good their retreat to Boston with the loss of 250 killed and wounded: that of the Americans was about 60.

188
A great
army as-
sembles
before Bos-
ton.

By this engagement the spirits of the Americans were so raised, that they meditated nothing less than the total expulsion of the British troops from Boston. An army of 20,000 men was assembled, who formed a line of encampment from Roxbury to Mystic, through a space of about 30 miles; and here they were soon after joined by a large body of Connecticut troops, under General Putnam, an old officer of great bravery and experience. By this formidable force was the town of Boston now kept blocked up. General Gage, however, had so strongly fortified it, that the enemy, powerful as they were, durst not make an attack; while, on the other hand, his force was by far too insignificant to meet such an enemy in the field. But towards the end of May, a considerable reinforcement having arrived, with Generals Howe, Burgoyne, and Clinton, he was soon enabled to attempt something of consequence; and this the boasts of the provincials, that they were besieging those who had been sent to subdue them, seemed to render necessary. Some skirmishes in the mean time happened in the islands lying off Boston harbour, in which the Americans had the advantage, and burnt an armed schooner, which her people had been obliged to abandon after she was left aground by the tide. Nothing decisive, however, took place till the 17th of June. In the neighbourhood of Charlestown, a place on the northern shore of the peninsula on which Boston stands, is an high ground called *Bunker's Hill*, which overlooks and commands the whole town of Boston. In the night of the 16th the provincials took possession of this place; and worked with such indefatigable diligence, that, to the astonishment of their enemies, they had before day-light almost completed a redoubt, with a strong entrenchment reaching half a mile eastward, as far as the river Mystic. After this they were obliged to sustain a heavy and incessant fire from the ships and floating batteries with which Charlestown Neck was surrounded, as well as the cannon that could reach the place from Boston; in spite of which, however, they continued their work and finished it before mid-day. A considerable body of foot was then landed at the foot of Bunker's Hill, under the command of Generals Howe and Pigot; the former being appointed to attack the lines, and the latter the redoubt. The Americans, however, having the advantage of the ground, as well as of their intrenchments, poured down such incessant volleys as threatened the whole body with destruction; and General Howe was for a little time left almost alone, all his officers being killed or wounded. The

189
Battle at
Bunker's
Hill.

provincials in the mean time had taken possession of Charlestown, so that General Pigot was obliged to contend with them in that place as well as in the redoubt. The consequence was, that he was over-matched; his troops were thrown into disorder; and he would in all probability have been defeated, had not General Clinton advanced to his relief: upon which the attack was renewed with such fury, that the provincials were driven beyond the neck that leads to Charlestown. In the heat of the engagement the British troops were obliged to set fire to the town of Charlestown, which quickly obliged the provincials to yield after they were deprived of that shelter. The loss on the British side amounted to about 1000, among whom were 19 officers killed and 70 wounded; that of the Americans did not exceed 500.

The British troops claimed the victory in this engagement with justice, though it must be allowed that it was dearly bought; and the Americans boasted that the real advantages were on their side, as they had so much weakened the enemy, that they durst not afterwards venture out of their entrenchments. From the many advantages, however, which the Americans possessed, it is evident that the greatest display of valour was on the side of their enemies. The former were strongly entrenched, and most of their fortifications cannon proof; their soldiers were all chosen, and excellent marksmen, to whom muskets ready loaded were handed as fast as they were discharged; and when one party was wearied, another came to their assistance, as was perceived by the spectators on the tops of the houses at Boston. Considering, however, that this was the first time the provincials had been in actual service, it must be owned that they behaved with great spirit, and by no means merited the appellation of *cowards*, with which they were so often branded in Britain.

190
The Ame-
ricans be-
come more
and more
determin-
ed in their
opposition,

In other places the same determined spirit of resistance appeared on the part of the Americans. Lord North's conciliatory scheme was utterly rejected by the assemblies of Pennsylvania and New Jersey, and afterwards in every other colony. The commencement of hostilities at Lexington determined the colony of New York, which had hitherto continued to waver, to unite with the rest; and as the situation of New York renders it unable to resist an attack from the sea, it was resolved, before the arrival of a British fleet, to secure the military stores, send off the women and children, and to set fire to the city if it was still found incapable of defence. The exportation of provisions was every where prohibited, particularly to the British fishery on the banks of Newfoundland, or to such colonies of America as should adhere to the British interest. Congress resolved on the establishment of an army, and of a large paper-currency in order to support it. In the inland northern colonies, Colonels Easton and Ethan Allen, without receiving any orders from Congress, or communicating their design to any body, with a party of only 250 men, surprised the forts of Crown Point, Ticonderago, and the rest that form a communication betwixt the colonies and Canada. On this occasion 200 pieces of cannon fell into their hands, besides mortars and a large quantity of military stores, together with two armed vessels, and materials for the construction of others.

After

America.

After the battle of Bunker's Hill, the provincials erected fortifications on the heights which commanded Charlestown, and strengthened the rest in such a manner that there was no hope of driving them from thence; at the same time that their activity and boldness astonished the British officers, who had been accustomed to entertain too mean an opinion of their courage.

192

Troops in
Boston di-
stressed.

The troops, thus shut up in Boston, were soon reduced to distress. Their necessities obliged them to attempt the carrying off the American cattle on the islands before Boston, which produced frequent skirmishes; but the provincials, better acquainted with the navigation of these shores, landed on the islands, destroyed or carried off whatever was of any use, burned the light-house at the entrance of the harbour, and took prisoners the workmen sent to repair it, as well as a party of marines who guarded them. Thus the garrison were reduced to the necessity of sending out armed vessels to make prizes indiscriminately of all that came in their way, and of landing in different places to plunder for subsistence as well as they could.

193

Articles of
union be-
twixt the
colonies.

The congress in the mean time continued to act with all the vigour which its constituents had expected. Articles of confederation and perpetual union were drawn up and solemnly agreed upon; by which they bound themselves and their posterity for ever. These were in substance as follows:

1. Each colony was to be independent within itself, and to retain an absolute sovereignty in all domestic affairs.
2. Delegates to be annually elected to meet in congress, at such time and place as should be enacted in the preceding congress.
3. This assembly should have the power of determining war or peace, making alliances; and in short all that power which sovereigns of states usually claim as their own.
4. The expences of war to be paid out of the common treasury, and raised by a poll-tax on males between 16 and 60: the proportions to be determined by the laws of the colony.
5. An executive council to be appointed to act in place of the congress during its recess.
6. No colony to make war with the Indians without consent of congress.
7. The boundaries of all the Indian lands to be secured and ascertained to them; and no purchases of lands were to be made by individuals, or even by a colony, without consent of congress.
8. Agents appointed by congress should reside among the Indians, to prevent frauds in trading with them, and to relieve, at the public expence, their wants and distresses.
9. This confederation to last until there should be a reconciliation with Britain; or, if that event should not take place, it was to be perpetual.

194
Declara-
tion on ta-
king up
arms.

After the action of Bunker's Hill, however, when the power of Great Britain appeared less formidable in the eyes of America than before, congress proceeded formally to justify their proceedings in a declaration drawn up in terms more expressive, and well calculated to excite attention.

"Were it possible (said they) for men who exercise their reason, to believe that the divine Author of
N^o 15.

our existence intended a part of the human race to hold an absolute property in and unbounded power over others, marked out by His infinite goodness and wisdom as the objects of a legal domination, never rightfully resistible, however severe and oppressive; the inhabitants of these colonies might at least require from the parliament of Great Britain some evidence that this dreadful authority over them had been granted to that body: but a reverence for our Great Creator, principles of humanity, and the dictates of common sense, must convince all those who reflect upon the subject, that government was instituted to promote the welfare of mankind, and ought to be administered for the attainment of that end.

"The legislature of Great Britain, however, stimulated by an inordinate passion for power, not only unjustifiable, but which they know to be peculiarly reprobated by the very constitution of that kingdom; and despairing of success in any mode of contest where regard should be had to law, truth, or right; have at length, deserting those, attempted to effect their cruel and impolitic purpose of enslaving these colonies by violence, and have thereby rendered it necessary for us to close with their last appeal from reason to arms. Yet, however blinded that assembly may be, by their intemperate rage for unlimited domination, so to slight justice in the opinion of mankind, we esteem ourselves bound by obligations to the rest of the world to make known the justice of our cause."

After taking notice of the manner in which their ancestors left Britain, the happiness attending the mutual friendly commerce betwixt that country and her colonies, and the remarkable success of the late war, they proceed as follows: "The new ministry finding the brave foes of Britain, though frequently defeated, yet still contending, took up the unfortunate idea of granting them a hasty peace, and of then subduing her faithful friends."

"These devoted colonies were judged to be in such a state as to present victories without bloodshed, and all the easy emoluments of statutable plunder. The uninterrupted tenor of their peaceable and respectful behaviour from the beginning of their colonization; their dutiful, zealous, and useful services during the war, though so recently and amply acknowledged in the most honourable manner by his Majesty, by the late king, and by parliament, could not save them from the intended innovations. Parliament was influenced to adopt the pernicious project; and assuming a new power over them, has in the course of eleven years given such decisive specimens of the spirit and consequences attending this power, as to leave no doubt of the effects of acquiescence under it."

"They have undertaken to give and grant our money without our consent, though we have ever exercised an exclusive right to dispose of our own property. Statutes have been passed for extending the jurisdiction of the courts of admiralty and vice-admiralty beyond their ancient limits; for depriving us of the accustomed and inestimable rights of trial by jury, in cases affecting both life and property; for suspending the legislature of one of our colonies; for interdicting all commerce to the capital of another; and for altering fundamentally the form of government established by charter, and secured by acts of its own legislature; and

America and solemnly confirmed by the crown; for exempting the murderers of colonists from legal trial, and in effect from punishment; for erecting in a neighbouring province, acquired by the joint arms of Great Britain and America, a despotism dangerous to our very existence; and for quartering soldiers upon the colonists in time of a profound peace. It has also been resolved in parliament, that colonists charged with committing certain offences, shall be transported to England to be tried.

"But why should we enumerate our injuries in detail?—By one statute it was declared, that parliament can of right make laws to bind us in all cases whatever. What is to defend us against so enormous, so unlimited a power? Not a single person who assumes it is chosen by us, or is subject to our control or influence; but on the contrary, they are all of them exempt from the operation of such laws; and an American revenue, if not diverted from the ostensible purposes from which it is raised, would actually lighten their own burdens in proportion as it increases ours.

"We saw the misery to which such despotism would reduce us. We for ten years incessantly and ineffectually besieged the throne as supplicants; we reasoned, we remonstrated with parliament in the most mild and decent language; but administration, sensible that we should regard these measures as freemen ought to do, sent over fleets and armies to enforce them.

"We have pursued every temperate, every respectful measure; we have even proceeded to break off all commercial intercourse with our fellow-subjects as our last peaceable admonition, that our attachment to no nation on earth would supplant our attachment to liberty: this we flattered ourselves was the ultimate step of the controversy; but subsequent events have shown how vain was this hope of finding moderation in our enemies!

"The Lords and Commons, in their address in the month of February, said, that a rebellion at that time actually existed in the province of Massachusetts Bay; and that those concerned in it had been countenanced and encouraged by unlawful combinations and engagements entered into by his Majesty's subjects in several of the colonies; and therefore they besought his Majesty that he would take the most effectual measures to enforce due obedience to the laws and authority of the supreme legislature. Soon after the commercial intercourse of whole colonies with foreign countries was cut off by an act of parliament; by another, several of them were entirely prohibited from the fisheries in the seas near their coasts, on which they always depended for their subsistence; and large reinforcements of ships and troops were immediately sent over to General Gage.

"Fruitless were all the intreaties, arguments, and eloquence of an illustrious band of the most distinguished peers and commoners, who nobly and strenuously asserted the justice of our cause, to stay, or even to mitigate, the heedless fury with which these accumulated outrages were hurried on. Equally fruitless was the interference of the city of London, of Bristol, and many other respectable towns in our favour."

After having reproached parliament, General Gage, and the British government in general, they proceed thus: "We are reduced to the alternative of choosing an unconditional submission to tyranny or resistance by

VOL. I. Part II.

force. The latter is our choice. We have counted the cost of this contest, and find nothing so dreadful as voluntary slavery. Honour, justice, and humanity, forbid us tamely to surrender that freedom which we received from our gallant ancestors, and which our innocent posterity have a right to receive from us. Our cause is just; our union is perfect; our internal resources are great; and, if necessary, foreign assistance is undoubtedly attainable. We fight not for glory or conquest; we exhibit to mankind the remarkable spectacle of a people attacked by unprovoked enemies. They boast of their privileges and civilization, and yet proffer no milder conditions than servitude or death. In our own native land, in defence of the freedom that is our birthright, for the protection of our property acquired by the honest industry of our forefathers and our own, against violence actually offered, we have taken up arms; we shall lay them down when hostilities shall cease on the part of our aggressors, and all danger of their being renewed shall be removed,—and not before."

These are some of the most striking passages in the declaration of congress on taking up arms against Great Britain, and dated July 6th 1775. Without inquiring whether the principles on which it is founded are right or wrong, the determined spirit which it shows, ought to have convinced us, that the conquest of America was an event scarce ever to be expected. In every other respect an equal spirit was shown; and the rulers of the British nation had the mortification to see those whom they styled *rebels* and *traitors*, succeed in negotiations in which they themselves were utterly foiled. In the passing of the Quebec-bill, ministry had flattered themselves that the Canadians would be so much attached to them on account of restoring the French laws, that they would very readily join in any attempt against the colonists who had reprobated that bill in such strong terms: but in this, as in every thing else indeed, they found themselves mistaken. The Canadians having been subject to Britain for a period of 15 years, and being thus rendered sensible of the superior advantages of British government, received the bill itself with evident marks of disapprobation; nay, reprobated it as tyrannical and oppressive. A scheme had been formed for General Carleton, governor of the province, to raise an army of Canadians wherewith to act against the Americans; and so sanguine were the hopes of administration in this respect, that they had sent 20,000 stand of arms, and a great quantity of military stores, to Quebec for the purpose. But the people, though they did not join the Americans, yet were found immovable in their purpose to stand neuter. Application was made to the bishop; but he declined to interpose his influence, as contrary to the rules of the Popish clergy: so that the utmost efforts of government in this province were found to answer little or no purpose.

The British administration next tried to engage the Indians in their cause. But though agents were dispersed among them with large presents to the chiefs, they universally replied, that they did not understand the nature of the quarrel, nor could they distinguish whether those who dwelt in America or on the other side of the ocean were in fault: but they were surprised to see Englishmen ask their assistance

America. against one another; and advised them to be reconciled, and not to think of shedding the blood of their brethren. —To the representations of congress they paid more respect. These set forth, that the English on the other side of the ocean had taken up arms to enslave not only their countrymen in America, but the Indians also; and if the latter should enable them to overcome the colonists, they themselves would soon be reduced to a state of slavery also. By arguments of this kind these savages were engaged to remain neuter; and thus the colonists were freed from a most dangerous enemy. On this occasion the congress thought proper to hold a solemn conference with the different tribes of Indians. The speech made by them on the occasion is curious, but too long to be fully inserted. The following is a specimen of the European mode of addressing these people.

197
Speech of
the com-
missioners
from con-
gress to
the Indi-
ans.

“ Brothers, Sachems, and Warriors !

“ We, the delegates from the Twelve United Provinces, now sitting in general congress at Philadelphia, send their talk to you our brothers.

“ Brothers and Friends, now attend !

“ When our fathers crossed the great water, and came over to this land, the King of England gave them a talk, assuring them that they and their children should be his children; and that if they would leave their native country, and make settlements, and live here, and buy and sell, and trade with their brethren beyond the water, they should still keep hold of the same covenant-chain, and enjoy peace; and it was covenanted, that the fields, houses, goods, and possessions, which our fathers should acquire, should remain to them as their own, and be their childrens for ever, and at their sole disposal.

“ Brothers and Friends, open a kind ear !

“ We will now tell you of the quarrel betwixt the counsellors of King George and the inhabitants and colonies of America.

“ Many of his counsellors have persuaded him to break the covenant-chain, and not to send us any more good talks. They have prevailed upon him to enter into a covenant against us; and have torn asunder, and cast behind their backs, the good old covenant which their ancestors and ours entered into, and took strong hold of. They now tell us they will put their hands into our pocket without asking, as though it were their own; and at their pleasure they will take from us our charters, or written civil constitution, which we love as our lives; also our plantations, our houses, and goods, whenever they please, without asking our leave. They tell us, that our vessels may go to that or this island in the sea, but to this or that particular island we shall not trade any more; and in case of our non-compliance with these new orders, they shut up our harbours.

“ Brothers, we live on the same ground with you; the same island is our common birth-place. We desire to sit down under the same tree of peace with you: let us water its roots, and cherish the growth, till the large leaves and flourishing branches shall extend to the setting sun, and reach the skies. If any thing disagreeable should ever fall out between us, the Twelve United Colonies, and you, the Six Nations, to wound our peace, let us immediately seek measures for heal-

ing the breach. From the present situation of our affairs, we judge it expedient to kindle up a small fire at Albany, where we may hear each other's voice, and disclose our minds fully to one another.”

The other remarkable transactions of this congress were the ultimate refusal of the conciliatory proposal made by Lord North, of which such sanguine expectations had been formed by the English ministry; and appointing a generalissimo to command their armies, Gen. Washington which were now very numerous. The person chosen for this purpose was George Washington: a man so universally beloved, that he was raised to such a high station by the unanimous voice of congress; and his subsequent conduct shewed him every way worthy of it. Horace Gates and Charles Lee, two English officers of considerable reputation, were also chosen; the former an adjutant-general, the second a major-general. Artemus Ward, Philip Schuyler, and Israel Putnam, were likewise nominated major-generals. Seth Pomeroy, Richard Montgomery, David Wooster, William Heath, Joseph Spencer, John Thomas, John Sullivan, and Nathaniel Green, were chosen brigadier-generals at the same time.

Congress had now also the satisfaction to receive deputies from the colony of Georgia, expressing a desire to join the confederacy. The reasons they gave for renouncing their allegiance to Britain was, that the conduct of parliament towards the other colonies had been oppressive; that though the obnoxious acts had not been extended to them, they could view this only as an omission, because of the seeming little consequence of their colony; and therefore looked upon it rather to be a slight than a favour. At the same time they framed a petition to the King, similar to that sent by the other colonies, and which met with a similar reception.

The success which had hitherto attended the Americans in all their measures, now emboldened them to think not only of defending themselves, but likewise of acting offensively against Great Britain. The conquest of Canada appeared an object within their reach, and one that would be attended with many advantages; and as an invasion of that province was already facilitated by the taking of Crown Point and Ticonderago, it was resolved if possible to penetrate that way into Canada, and reduce Quebec during the winter, before the fleets and armies which they were well assured would sail thither from Britain, should arrive. By order of congress, therefore, 3000 men were put under the command of Generals Montgomery and Schuyler, with orders to proceed to Lake Champlain, from whence they were to be conveyed in flat-bottomed boats to the mouth of the river Sorel, a branch of the great river St. Laurence, and on which is situated a fort of the same name with the river. On the other hand, they were opposed by General Carleton governor of Canada; a man of great activity, and experience in war; who, with a very few troops, had hitherto been able to keep in awe the disaffected people of Canada, notwithstanding all the representations of the colonists. He had now augmented his army by a considerable number of Indians, and promised even in his present situation to make a very formidable resistance.

As soon as General Montgomery arrived at Crown Point,

198

Gen. Wash-
ington ap-
pointed
command-
er in chief.

199

Georgia
accedes to
the confe-
deracy.

200

The Amer-
icans at-
tempt the
conquest
of Canada.

America. Point, he received information that several armed vessels were stationed at St John's, a strong fort on the Sorel, with a view to prevent his crossing the lake; on which he took possession of an island which commands the mouth of the Sorel, and by which he could prevent them from entering the lake. In conjunction with General Schuyler, he next proceeded to St John's: but finding that place too strong, he landed on a part of the country considerably distant, and full of woods and swamps. From thence, however, they were driven by a party of Indians whom General Carleton had employed.

201
Chamblée
taken.

The provincial army was now obliged to retreat to the island of which they had at first taken possession; where General Schuyler being taken ill, Montgomery was left to command alone. His first step was to gain over the Indians whom Gen. Carleton had employed, and this he in a great measure accomplished; after which, on receiving the full number of troops appointed for his expedition, he determined to lay siege to St John's. In this he was facilitated by the reduction of Chamblée, a small fort in the neighbourhood, where he found a large supply of powder. An attempt was made by General Carleton to relieve the place; for which purpose he with great pains collected about 1000 Canadians, while Colonel Maclean proposed to raise a regiment of the Highlanders who had emigrated from their own country to America.

202
General
Carleton
defeated.

But while Gen. Carleton was on his march with these new levies, he was attacked by a superior force of provincials, and utterly defeated; which being made known to another body of Canadians who had joined Colonel Maclean, they abandoned him without striking a blow, and he was obliged to retreat to Quebec.

The defeat of General Carleton was a sufficient recompence to the Americans for that of Colonel Ethan Allen, which had happened some time before. The success which had attended this gentleman against Crown Point and Ticonderago had emboldened him to make a similar attempt on Montreal; but being attacked by the militia of the place, supported by a detachment of regulars, he was entirely defeated and taken prisoner.

203
St John's
fort taken,

As the defeat of General Carleton and the desertion of Maclean's forces left no room for the garrison of St John's to hope for any relief, they now consented to surrender themselves prisoners of war; but were in other respects treated with great humanity. They were in number 500 regulars and 200 Canadians, among whom were many of the French nobility, who had been very active in promoting the cause of Britain among their countrymen.

204
And like-
wise Mont-
real.

General Montgomery next took measures to prevent the British shipping from passing down the river from Montreal to Quebec. This he accomplished so effectually, that the whole were taken. The town itself was obliged to surrender at discretion; and it was with the utmost difficulty that General Carleton escaped in an open boat by the favour of a dark night.

No further obstacle now remained in the way of the Americans to the capital, except what arose from the nature of the country; and these indeed were very considerable. Nothing, however, could damp the ardour of the provincials. Notwithstanding it was now the

middle of November, and the depth of winter was at hand, Colonel Arnold formed a design of penetrating through woods, morasses, and the most frightful solitudes from New England to Canada by a nearer way than that which Montgomery had chosen; and this he accomplished in spite of every difficulty, to the astonishment of all who saw or heard of the attempt.

205
Col. Arnold
penetrates
into Cana-
da.

This desperate march, however, cannot be looked upon as conducive to any good purpose. A third part of his men under another colonel had abandoned him by the way, under pretence of want of provisions; the total want of artillery rendered his presence insignificant before a place strongly fortified; and the smallness of his army rendered it even doubtful whether he could have taken the town by surprise. The Canadians indeed were amazed at the exploit, and their inclination to revolt from Britain was somewhat augmented; but none of them as yet took up arms in behalf of America. The consternation into which the town of Quebec was thrown proved detrimental rather than otherwise to the expedition; as it doubled the vigilance and activity of the inhabitants to prevent any surprise; and the appearance of common danger united all parties, who, before the arrival of Arnold, were contending most violently with one another. He was therefore obliged to content himself with blocking up the avenues to the town, in order to distress the garrison for want of provisions; and even this he was unable to do effectually, by reason of the small number of his men.

The matter was not much mended by the arrival of General Montgomery. The force he had with him, even when united to that of Arnold, was too insignificant to attempt the reduction of a place so strongly fortified, especially with the assistance only of a few mortars and field-pieces. After the siege had continued through the month of December, General Montgomery, conscious that he could accomplish his end no other way than by surprise, resolved to make an attempt on the last day of the year 1775. The method he took at this time was perhaps the best that human wisdom could devise. He advanced by break of day, in the midst of an heavy fall of snow, which covered his men from the sight of the enemy. Two real attacks were made by himself and Colonel Arnold, at the same time that two feigned attacks were made on two other places, thus to distract the garrison, and make them divide their forces. One of the real attacks was made by the people of New York, and the other by those of New England under Arnold. Their hopes of surprising the place, however, were defeated by the signal for the attack being through some mistake given too soon. General Montgomery himself had the most dangerous place, being obliged to pass between the river and some high rocks on which the Upper Town stands; so that he was forced to make what haste he could to close with the enemy. His fate, however, was now decided. Having forced the first barrier, a violent discharge of musketry and grape-shot from the second killed him, his principal officers, and the most of the party he commanded; on which those who remained immediately retreated. Colonel Arnold in the mean time made a desperate attack on the Lower Town, and carried one of the barriers after an obstinate resistance for an hour; but in the action he himself

206
Attempt
to surprise
Quebec.

207
General
Montgo-
mery kill-
ed, and the
Americans
defeated.

America. received a wound, which obliged him to withdraw. The attack, however, was continued by the officers whom he had left, and another barrier forced: but the garrison, now perceiving that nothing was to be feared except from that quarter, collected their whole force against it; and, after a desperate engagement of three hours, overpowered the provincials, and obliged them to surrender.

In this action, it must be confessed that the valour of the provincial troops could not be exceeded. They had fought under as great disadvantages as those which attended the British at Bunker's Hill, and had behaved equally well. Such a terrible disaster left no hope remaining of the accomplishment of their purpose, as General Arnold could now scarce number 800 effective men under his command. He did not, however, abandon the province, or even remove to a greater distance than three miles from Quebec; and here he still found means to annoy the garrison very considerably by intercepting their provisions. The Canadians, notwithstanding the bad success of the American arms, still continued friendly; and thus he was enabled to sustain the hardships of a winter encampment in that most severe climate. The congress, far from passing any censure on him for his misfortune, created him a brigadier-general.

208
Arnold
created a
Brigadier-
General.

209
Disputes of
Lord Dun-
more with
his pro-
vince of
Virginia.

While hostilities were thus carried on with vigour in the north, the flame of contention was gradually extending itself in the south. Lord Dunmore, the governor of Virginia, was involved in disputes similar to those which had taken place in other colonies. These had proceeded so far that the assembly was dissolved; which in this province was attended with a consequence unknown to the rest. As Virginia contained a great number of slaves, it was necessary that a militia should be kept constantly on foot to keep them in awe. During the dissolution of the assembly the militia-laws expired; and the people, after complaining of the danger they were in from the negroes, formed a convention, which enacted that each county should raise a quota for the defence of the province. Dunmore, on this, removed the powder from Williamsburg; which created such discontents, that an immediate quarrel would probably have ensued, had not the merchants of the town undertaken to obtain satisfaction for the injury supposed to be done to the community. This tranquillity, however, was soon interrupted; the people, alarmed by a report that an armed party were on their way from the man of war where the powder had been deposited, assembled in arms, and determined to oppose by force any farther removals. In some of the conferences which passed at this time, the governor let fall some unguarded expressions, such as threatening them with setting up the royal standard, proclaiming liberty to the negroes, destroying the town of Williamsburg, &c. which were afterwards made public, and exaggerated in such a manner as greatly to increase the public ferment.

The people now held frequent assemblies. Some of them took up arms with a design to force the governor to restore the powder, and to take the public money into their own possession: but on their way to Williamsburg for this purpose, they were met by the receiver-general, who became security for the payment

of the gun-powder, and the inhabitants promised to take care of the magazine and public revenue.

By this insurrection the governor was so much intimidated, that he sent his family on board a man of war. He himself, however, issued a proclamation, in which he declared the behaviour of the person who promoted the tumult treasonable, accused the people of disaffection, &c. On their part they were by no means deficient in recriminating; and some letters of his to Britain being about the same time discovered, consequences ensued extremely similar to those which had been occasioned by those of Mr Hutchinson at Boston.

210
He sends
his family
aboard a
man of war.

In this state of confusion the governor thought it necessary to fortify his palace with artillery, and procure a party of marines to guard it. Lord North's conciliatory proposal arriving also about the same time, he used his utmost endeavours to cause the people comply with it. The arguments he used were such as must do him honour; and had not matters already gone to such a pitch of distraction, it is highly probable that some attention would have been paid to them.

211
Fortifies
his palace.

“The view (he said) in which the colonies ought to behold this conciliatory proposal, was no more than an earnest admonition from Great Britain to relieve her wants: that the utmost condescendence had been used in the mode of application; no determinate sum having been fixed, as it was thought most worthy of British generosity to take what they thought could be conveniently spared, and likewise to leave the mode of raising it to themselves,” &c. But the clamour and dissatisfaction were now so universal, that nothing else could be attended to. The governor had called an assembly for the purpose of laying this conciliatory proposal before them: but it had been little attended to. The assembly began their session by inquiries into the state of the magazine. It had been broken into by some of the townsmen; for which reason spring-guns had been placed there by the governor, which discharged themselves upon the offenders at their entrance: these circumstances, with others of a similar kind, raised such a violent uproar, that as soon as the preliminary business of the session was over, the governor retired on board a man of war, informing the assembly that he durst no longer trust himself on shore. This produced a long course of disputation, which ended in a positive refusal of the governor to trust himself again in Williamsburg, even to give his assent to the bills, which could not be passed without it, and though the assembly offered to bind themselves for his personal safety. In his turn he requested them to meet him on board the man of war, where he then was; but this proposal was rejected, and all further correspondence containing the least appearance of friendship was discontinued.

212
His argu-
ments for
L. North's
conciliato-
ry plan.

213
The go-
vernor re-
tires on
board a
man of
war.

Lord Dunmore, thus deprived of his government, attempted to reduce by force those whom he could no longer govern. Some of the most strenuous adherents to the British cause, whom their zeal had rendered obnoxious at home, now repaired to him. He was also joined by numbers of black slaves. With these and the assistance of the British shipping, he was for some time enabled to carry on a kind of predatory war sufficient to hurt and exasperate, but not to subdue. After some inconsiderable attempts on land, proclaim-

214

ing

America. ing liberty to the slaves, and setting up the royal standard, he took up his residence at Norfolk, a maritime town of some consequence, where the people were better affected to Britain than in most other places. A considerable force, however, was collected against him; and the natural impetuosity of his temper prompting him to act against them with more courage than caution, he was entirely defeated, and obliged to retire to his shipping, which was now crowded by the number of those who had incurred the resentment of the provincials.

215 But is entirely defeated.
216 Mr Conolly's plan for reducing Virginia.
217 He is discovered and taken prisoner.
In the mean time a scheme of the utmost magnitude and importance was formed by one Mr Conolly, a Pennsylvanian of an intrepid and aspiring disposition, and attached to the cause of Britain. The first step of this plan was to enter into a league with the Ohio Indians. This he communicated to Lord Dunmore, and it received his approbation: Upon which Conolly set out, and actually succeeded in his design. On his return he was dispatched to General Gage, from whom he received a colonel's commission, and set out in order to accomplish the remainder of his scheme. The plan in general was, that he should return to the Ohio, where, by the assistance of the British and Indians in these parts, he was to penetrate through the back settlements into Virginia, and join Lord Dunmore at Alexandria. But by an accident very naturally to be expected, he was discovered, taken prisoner, and thrown into a dungeon.

218 Cruelty of the Americans.
219 The town of Norfolk destroyed.
220 The governors of South and North Carolina expelled.
After the retreat of Lord Dunmore from Norfolk, that place was taken possession of by the provincials, who treated the loyalists that had remained there with great cruelty; at the same time that they greatly distressed those on board Lord Dunmore's fleet, by refusing to supply them with any necessaries. Nor was this all; the vicinity of the shipping was so great as to afford the riflemen an opportunity of aiming at the people on board, and exercising the cruel occupation of killing them, in which they did not fail every day to employ themselves. These proceedings at last drew a remonstrance from his Lordship; in which he insisted that the fleet should be furnished with necessaries, and that the soldiers should desist from the cruel diversion above-mentioned; but both these requests being denied, a resolution was taken to set fire to the town. After giving the inhabitants proper warning, a party landed, under cover of a man of war, and set fire to that part which lay nearest the shore; but the flames were observed at the same time to break forth in every other quarter, and the whole town was reduced to ashes. This universal destruction, by which a loss of more than L. 300,000 was incurred, is said to have been occasioned by order of the congress itself, that the loyalists might find no refuge there for the future.

In the southern colonies of Carolina the governors were expelled and obliged to take refuge on board of men of war, as Lord Dunmore had been: Mr Martin, governor of North Carolina, on a charge of attempting to raise the back-settlers, consisting chiefly of Scots Highlanders, against the colony. Having secured themselves against any attempts from these enemies, however, they proceeded to regulate their internal concerns in the same manner as the rest of the colonies; and by the end of the year 1775, Britain beheld the whole of America united against her in the most determined opposition.

Her vast possessions of that tract of land (since known by **America.** the name of the *Thirteen United States*) were now reduced to the single town of Boston; in which her forces were besieged by an enemy with whom they were apparently not able to cope, and by whom they must of course expect in a very short time to be expelled. The situation of the inhabitants of Boston, indeed, was peculiarly unhappy. After having failed in their attempts to leave the town, General Gage had consented to allow them to retire with their effects; but afterwards, for what reason does not well appear, he refused to fulfil his promise. When he resigned his place to General Howe, in October 1775, the latter, apprehensive that they might give intelligence of the situation of the British troops, strictly prohibited any person from leaving the place under pain of military execution. Thus matters continued till the month of March 1776, when the town was evacuated.

221 Miserable situation of the inhabitants of Boston.
222 Boston severely cannonaded by the provincials.
On the 2d of that month, General Washington opened a battery on the west side of the town, from whence it was bombarded with a heavy fire of cannon at the same time; and three days after, it was attacked by another battery from the eastern shore. This terrible attack continued for 14 days without intermission; when General Howe, finding the place no longer tenible, determined if possible to drive the enemy from their works. Preparations were therefore made for a most vigorous attack on an hill called Dorchester Neck, which the Americans had fortified in such a manner as would in all probability have rendered the enterprise next to desperate. No difficulties, however, were sufficient to daunt the spirit of the general; and every thing was in readiness, when a sudden storm prevented this intended exertion of British valour. Next day, upon a more close inspection of the works they were to attack, it was thought advisable to desist from the enterprise altogether. The fortifications were very strong, and extremely well provided with artillery; and besides other implements of destruction, upwards of 100 hogshheads of stones were provided to roll down upon the enemy as they came up; which, as the ascent was extremely steep, must have done prodigious execution.

223 The place evacuated.
Nothing therefore now remained but to think of a retreat; and even this was attended with the utmost difficulty and danger. The Americans, however, knowing that it was in the power of the British general to reduce the town to ashes, which could not have been repaired in many years, did not think proper to give the least molestation; and for the space of a fortnight the troops were employed in the evacuation of the place, from whence they carried along with them 2000 of the inhabitants, who durst not stay on account of their attachment to the British cause. From Boston they sailed to Halifax; but all their vigilance could not prevent a number of valuable ships from falling into the hands of the enemy. A considerable quantity of cannon and ammunition had also been left at Bunker's Hill and Boston Neck; and in the town, an immense variety of goods, principally woollen and linen, of which the provincials stood very much in need. The estates of those who fled to Halifax were confiscated; as also those who were attached to government, and had remained in the town. As an attack was expected as soon as the British forces should arrive, every method was

²²⁴ America. was employed to render the fortifications, already very strong, impregnable. For this purpose some foreign engineers were employed, who had before arrived at Boston; and so eager were people of all ranks to accomplish this business, that every able-bodied man in the place, without distinction of rank, set apart two days in the week, to complete it the sooner.

²²⁵ Congress declare the States of America independent. The Americans, exasperated to the utmost by the proceedings of parliament, now formally renounced all connection with Britain, and declared themselves independent. This celebrated declaration was published on the 4th of July 1776. Previous to this a circular letter had been sent through each colony, stating the reasons for it; and such was the animosity now every where prevailing against Great Britain, that it met with universal approbation, except in the province of Maryland alone. It was not long, however, before the people of that colony, finding themselves left in a very dangerous minority, thought proper to accede to the measures of the rest. The manifesto itself was much in the usual style, stating a long list of grievances, for which redress had been often applied in vain; and for these reasons they determined on a final separation; to hold the people of Britain as the rest of mankind, "enemies in war, in peace friends."

²²⁶ The siege of Quebec still continued. After this publicly throwing off all allegiance and hope of reconciliation, the colonists soon found that an exertion of all their strength was required in order to support their pretensions. Their arms, indeed, had not, during this season, been attended with success in Canada. Reinforcements had been promised to Colonel Arnold, who still continued the blockade of Quebec; but they did not arrive in time to second his operations. Being sensible, however, that he must either desist from the enterprise, or finish it successfully, he recommenced in form; attempting to burn the shipping, and even to storm the town itself. They were unsuccessful, however, by reason of the smallness of their number, though they succeeded so far as to burn a number of houses in the suburbs; and the garrison were obliged to pull down the remainder, in order to prevent the fire from spreading.

²²⁷ Canadians defeated by the provincials; As the provincials, though unable to reduce the town, kept the garrison in continual alarms, and in a very disagreeable situation, some of the nobility collected themselves into a body under the command of one Mr Beaujeu, in order to relieve their capital; but they were met on their march by the provincials, and so entirely defeated, that they were never afterwards able to attempt any thing. The Americans, however, had but little reason to plume themselves on this success. Their want of artillery at last convinced them, that it was impracticable in their situation to reduce a place so strongly fortified: the small-pox at the same time made its appearance in their camp, and carried off great numbers; intimidating the rest to such a degree, that they deserted in crowds. To add to their misfortunes, the British reinforcements unexpectedly appeared, and the ships made their way through the ice with such celerity, that the one part

²²⁸ Who are in their turn defeated by General Carleton. of their army was separated from the other; and General Carleton sallied out as soon as the reinforcement was landed, obliged them to fly with the utmost precipitation, leaving behind them all their cannon and military stores; at the same time that their shipping was

entirely captured by vessels sent up the river for that purpose. On this occasion the provincials fled with such precipitation that they could not be overtaken; so that none fell into the hands of the British excepting the sick and wounded. General Carleton now gave a signal instance of his humanity: Being well apprised that many of the provincials had not been able to accompany the rest in their retreat, and that they were concealed in woods, &c. in a very deplorable situation, he generously issued a proclamation, ordering proper persons to seek them out, and give them relief at the public expence; at the same time least, through fear of being made prisoners, they should refuse these offers of humanity, he promised that, as soon as their situation enabled them, they should be at liberty to depart to their respective homes.

²²⁹ Humanity of the British general. The British general, now freed from any danger of an attack, was soon enabled to act offensively against the provincials, by the arrival of the forces destined for that purpose from Britain. By these he was put at the head of 12,000 regular troops, among whom were those of Brunswick. With this force he instantly set out to the Three Rivers, where he expected that Arnold would have made a stand; but he had fled to Sorel, a place 150 miles distant from Quebec, where he was at last met by the reinforcements ordered by congress. Here, though the preceding events were by no means calculated to inspire much military ardour, a very daring enterprise was undertaken; and this was, to surprise the British troops posted here under General Fraser and Nesbit; of whom the former commanded those on land, the latter such as were on board of transports and were but a little way distant. The enterprise was undoubtedly very hazardous, both on account of the strength of the parties against whom they were to act, and as the main body of the British forces were advanced within 50 miles of the place; besides that a number of armed vessels and transports with troops lay between them and the Three Rivers. Two thousand chosen men, however, under General Thomson, engaged in this enterprise. Their success was by no means answerable to their spirit and valour. Though they passed the shipping without being observed, General Fraser had notice of their landing; and thus being prepared to receive them, they were soon thrown into disorder, at the same time that General Nesbit, having landed his forces, prepared to attack them in the rear. On this occasion some field-pieces did prodigious execution, and a retreat was found to be unavoidable. General Nesbit, however, had got between them and their boats; so that they were obliged to take a circuit through a deep swamp, while they were hotly pursued by both parties at the same time, who marched for some miles on each side of the swamp, till at last the miserable provincials were sheltered from further danger by a wood at the end of the swamp. Their general, however, was taken, with 200 of his men.

²³⁰ He pursues the provincials. By this disaster the provincials lost all hopes of accomplishing any thing in Canada. They demolished their works, and carried off their artillery with the utmost expedition. They were pursued, however, by General Burgoyne; against whom it was expected that they would have collected all their force, and made a resolute stand. But they were now too much dispirited

²³¹ General Thomson defeated and taken prisoner by General Fraser.

²³² The provincials pursued by Gen. Burgoyne;

²³¹ America. ed by misfortune, to make any further exertions of valour. On the 18th of June the British general arrived at Fort St John's, which he found abandoned and burnt. Chamblee had shared the same fate, as well as all the vessels that were not capable of being dragged up against the current of the river. It was thought that they would have made some resistance at Nut Island, the entrance to lake Champlain; but this also they had abandoned, and retreated across the lake to Crown Point, whither they could not be immediately followed. Thus was the province of Canada entirely evacuated by the Americans; whose loss in their retreat from Quebec was not calculated at less than 1000 men, of whom 400 fell at once into the hands of the enemy at a place called the Cedars, about 50 miles above Montreal. General Sullivan, however, who conducted this retreat after the affair of General Thomson, was acknowledged to have had great merit in what he did, and received the thanks of congress accordingly.

²³⁴ An insurrection in North Carolina in favour of Britain.

This bad success in the north, however, was somewhat compensated by what happened in the southern colonies.—We have formerly taken notice that Mr Martin, governor of North Carolina, had been obliged to leave his province and take refuge on board a man of war. Notwithstanding this, he did not despair of reducing it again to obedience. For this purpose he applied to the Regulators, a daring set of banditti, who lived in a kind of independent state; and though considered by government as rebels, yet had never been molested, on account of their numbers and known skill in the use of fire-arms. To the chiefs of these people commissions were sent, in order to raise some regiments; and Colonel Macdonald, a brave and enterprising officer, was appointed to command them. In the month of February he erected the king's standard, issued proclamations, &c. and collected some forces, expecting to be soon joined by a body of regular troops, who were known to be shipped from Britain to act against the southern colonies. The Americans, sensible of their danger, dispatched immediately what forces they had to act against the royalists, at the same time that they diligently exerted themselves to support these with suitable reinforcements. Their present force was commanded by a General Moore, whose numbers were inferior to Macdonald; for which reason the latter summoned him to join the king's standard under pain of being treated as a rebel. But Moore, being well provided with cannon, and conscious that nothing could be attempted against him, returned the compliment, by acquainting Colonel Macdonald, that if he and his party would lay down their arms, and subscribe an oath of fidelity to congress, they should be treated as friends; but if they persisted in an undertaking for which it was evident they had not sufficient strength, they could not but expect the severest treatment. In a few days General Moore found himself at the head of 8000 men, by reason of the continual supplies which daily arrived from all parts. The royal party amounted only to 2000, and they were destitute of artillery, which prevented them from attacking the enemy while they had the advantage of numbers. They were now therefore obliged to have recourse to a desperate exertion of personal valour; by dint of which they effected a retreat for 80 miles to Moore's Creek, within 16 miles of Wilmington. Could they have gained this

place, they expected to have been joined by Governor America. Martin and General Clinton, who had lately arrived with a considerable detachment. But Moore with his army pursued them so close, that they were obliged to attempt the passage of the Creek itself, though a considerable body of the enemy, under the command of Colonel Coswell, with fortifications well planted with cannon, was posted on the other side. On attempting the Creek, however, it was found not to be fordable. They were obliged therefore to cross over a wooden bridge, which the provincials had not time to destroy entirely. They had, however, by pulling up part of the planks, and greasing the remainder in order to render them slippery, made the passage so difficult, that the royalists could not attempt it. In this situation they were, on the 27th of February, attacked by Moore, with his superior army, and totally defeated with the loss of their general and most of their leaders, as well as the best and bravest of their men.

Thus was the power of the provincials established in North Carolina. Nor were they less successful in the province of Virginia; where Lord Dunmore, having long continued an useless predatory war, was at last driven from every creek and road in the province. The people he had on board were distressed to the highest degree by confinement in small vessels. The heat of the season, and the numbers crowded together, produced a pestilential fever, which made great havoc, especially among the blacks. At last, finding themselves in the utmost hazard of perishing by famine as well as disease, they set fire to the least valuable of their vessels, reserving only about 50 for themselves, in which they bid a final adieu to Virginia, some sailing to Florida, some to Bermuda, and the rest to the West Indies.

In South Carolina the provincials had a more formidable enemy to deal with. A squadron, whose object was the reduction of Charlestown, had been fitted out in December 1775; but by reason of unfavourable weather did not reach Cape Fear in North Carolina till the month of May 1776: and here it met with further obstacles till the end of the month. Thus the Americans, always noted for their alertness in raising fortifications, had time to strengthen those of Charlestown in such a manner as rendered it extremely difficult to be attacked. The British squadron consisted of two 50 gun ships, four of 30 guns, two of 20, an armed schooner and bomb-ketch; all under the command of Sir Peter Parker. The land forces were commanded by Lord Cornwallis, with Generals Clinton and Vaughan. As they had yet no intelligence of the evacuation of Boston, General Howe dispatched a vessel to Cape Fear with some instructions; but it was too late; and in the beginning of June the squadron anchored off Charlestown bar. Here they met with some difficulty in crossing, being obliged to take out the guns from the two large ships, which were, notwithstanding, several times in danger of sticking fast. The next obstacle was a strong fort on Sullivan's island, six miles east from Charlestown; which, though not completely finished, was very strong. However, the British generals resolved without hesitation to attack it; but though an attack was easy from the sea, it was very difficult to obtain a co-operation of the land forces. This was attempted by landing them on Long.

America. Long Island, adjacent to Sullivan's Island on the east, from which it is separated by a very narrow creek, said not to be above two feet deep at low water. Opposite to this ford the provincials had posted a strong body of troops, with cannon and intrenchments; while General Lee was posted on the main land, with a bridge of boats betwixt that and Sullivan's Island, so that he could at pleasure send reinforcements to the troops in the fort on Sullivan's Island.

On the part of the British, so many delays occurred, that it was the 28th of June before matters were in readiness for an attack; and by this time the provincials had abundantly provided for their reception. On the morning of that day the bomb-ketch began to throw shells into Fort Sullivan, and about mid-day the two 50 gun ships and 30 gun frigates came up and began a severe fire. Three other frigates were ordered to take their station between Charlestown and the fort, in order to enfilade the batteries, and cut off the communication with the main land; but through the ignorance of the pilots they all stuck fast; and though two of them were disentangled, they were found to be totally unfit for service: the third was burnt, that she might not fall into the hands of the enemy.

238
The fleet
make a fu-
rious at-
tack.

239
Bravery of
Captain
Morris.

240
The Bri-
tish repul-
sed.

The attack was therefore confined to the five armed ships and bomb-ketch, between whom and the fort a dreadful fire ensued. The Bristol suffered excessively. The springs on her cable being shot away, she was for some time entirely exposed to the enemy's fire. As the enemy poured in great quantities of red-hot balls, she was twice in flames. The captain (Mr Morris) after receiving five wounds, was obliged to go below deck in order to have his arm amputated. After undergoing this operation he returned to his place, where he received another wound, but still refused to quit his station: at last he received a red-hot ball in his belly which instantly put an end to his life. Of all the officers and seamen who stood on the quarter-deck of this vessel, not one escaped without a wound excepting Sir Peter Parker alone; whose intrepidity and presence of mind on this occasion was very remarkable. The engagement lasted till darkness put an end to it. Little damage was done by the British, as the works of the enemy lay so low that many of the shot flew over; and the fortifications, being composed of palm-trees mixed with earth, were extremely well calculated to resist the impression of cannon. During the height of the attack, the provincial batteries remained for some time silent, so that it was concluded that they had been abandoned; but this was found to proceed only from want of powder; for as soon as a supply of this necessary article was obtained, the firing was resumed as brisk as before. During the whole of this desperate engagement it was found impossible for the land-forces to give the least assistance to the fleet. The enemy's works were found to be much stronger than they had been imagined, and the depth of water effectually prevented them from making any attempt. In this unsuccessful attack the killed and wounded on the part of the British amounted to about 200. The Bristol and Experiment were so much damaged, that it was thought they could not have been got over the bar; however, this was at last accomplished by a very great exertion of naval skill, to the surprise of the provincials, who had expected to make them both prizes.

N° 15.

On the American side the loss was judged to have been **America.** very considerable, as most of their guns were dismounted, and reinforcements had poured into the fort during the whole time of the action.

This year also, the Americans, having so frequently made trial of their valour by land, became desirous of trying it by sea also, and of forming a navy that might in some measure be able to protect their trade, and do essential hurt to the enemy. In the beginning of March Commodore Hopkins was dispatched with five frigates to the Bahama Islands, where he made himself master of the ordnance and military stores; but the gunpowder, which had been the principal object, was removed. On his return he captured several vessels; but was foiled in his attempt on the Glasgow frigate, which found means to escape notwithstanding the efforts of his whole squadron.

The time, however, was now come when the fortitude and patience of the Americans were to undergo a severe trial. Hitherto they had been on the whole successful in their operations: but now they were doomed to experience, misfortune, misery, and disgrace; the enemy over-running their country, and their own armies not able to face them in the field. The province of New York, as being the most central colony, and most accessible by sea, was pitched upon for the object of the main attack. The force sent against it consisted of 6 ships of the line, 30 frigates, besides other armed vessels, and a vast number of transports. The fleet was commanded by Lord Howe, and the land forces by his brother General Howe, who was now at Halifax. The latter, however, a considerable time before his brother arrived, had set sail from Halifax, and lay before New York, but without attempting to commence hostilities until he should be joined by his brother. The Americans had, according to custom, fortified New York and the adjacent islands in an extraordinary manner. However, General Howe was suffered to land his troops on Staten Island, where he was soon joined by a number of the inhabitants. About the middle of July, Lord Howe arrived with the grand armament; and being one of the commissioners appointed to receive the submission of the colonists, he published a circular letter to this purpose to the several governors who had lately been expelled from their provinces, desiring them to make the extent of his commission, and the powers he was invested with by parliament, as public as possible. Here, however, congress saved him trouble, by ordering his letter and declaration to be published in all the newspapers, that every one, as they said, might see the insidiousness of the British ministry, and that they had nothing to trust to besides the exertion of their own valour.

Lord Howe next sent a letter to General Washington; but as it was directed "To George Washington, Esq;" the General refused to accept of it, as not being directed in the style suitable to his station. To obviate this objection, Adjutant-general Paterson was sent with another letter, directed "To George Washington, &c. &c. &c." But though a very polite reception was given to the bearer, General Washington utterly refused the letter; nor could any explanation of the Adjutant induce him to accept of it. The only interesting part of the conversation was that relating to the powers of the commissioners, of which Lord Howe

241

Americans
form a
navy.

242

Armament
sent against
New York.

43

General
Howe landed
on Staten
island.

244

General
Washington
refused
a letter
from Lord
Howe.

was

America was one. The adjutant told him, that these powers were very extensive; that the commissioners were determined to exert themselves to the utmost, in order to bring about a reconciliation; and that he hoped the general would consider this visit as a step towards it. General Washington replied, that it did not appear that these powers consisted in any thing else than granting pardons; and as America had committed no offence, she asked no forgiveness, and was only defending her unquestionable rights.

245
Hostilities
commence

246
Situation
of the Bri-
tish and
American
armies.

247
The Ame-
ricans de-
feated
with great
slaughter.

248
They a-
bandon
their camp
in the
night.

The decision of every thing being now by consent of both parties left to the sword, no time was lost, but hostilities commenced as soon as the British troops could be collected. This, however, was not done before the month of August; when they landed without any opposition on Long Island, opposite to the shore of Staten Island. General Putnam, with a large body of troops, lay encamped and strongly fortified on a peninsula on the opposite shore, with a range of hills between the armies, the principal pass of which was near a place called *Flat-bush*. Here the centre of the British army, consisting of Hessians, took post; the left wing, under General Grant, lying near the shore; and the right, consisting of the greater part of the British forces, lay under Lord Percy, Cornwallis, and General Clinton. Putnam had ordered the passes to be secured by large detachments, which was executed as to those at hand; but one of the utmost importance, that lay at a distance, was entirely neglected. This gave an opportunity to a large body of troops under Lord Percy and Clinton to pass the mountains and attack the Americans in the rear, while they were engaged with the Hessians in front. Through this piece of negligence their defeat became inevitable. Those who were engaged with the Hessians first perceived their mistake, and began a retreat towards their camp; but the passage was intercepted by the British troops, who drove them back into the woods. Here they were met by the Hessians; and thus were they for many hours slaughtered between the two parties, no way of escape remaining but by breaking through the British troops, and thus regaining their camp. In this attempt many perished; and the right wing, engaged with General Grant, shared the same fate. The victory was complete; and the Americans lost on this fatal day (August 27th) between 3000 and 4000 men, of whom 2000 were killed in the battle or pursuit. Among these a regiment, consisting of young gentlemen of fortune and family in Maryland, was almost entirely cut in pieces, and of the survivors not one escaped without a wound.

The ardour of the British troops was now so great, that they could scarce be restrained from attacking the lines of the provincials; but for this there was now no occasion, as it was certain they could not be defended. Of the British only 61 were killed in this engagement, and 257 wounded. Eleven hundred of the enemy, among whom were three generals, were taken prisoners.

As none of the American commanders thought it proper to risk another attack, it was resolved to abandon their camp as soon as possible. Accordingly on the night of the 29th of August, the whole of the continental troops were ferried over with the utmost secrecy and silence; so that in the morning the British had

nothing to do but take possession of the camp and artillery which they had abandoned.

This victory, though complete, was very far from being so decisive as the conquerors imagined. Lord Howe, supposing that it would be sufficient to intimidate the congress into some terms, sent General Sullivan, who had been taken prisoner in the late action, to congress, with a message, importing, that though he could not consistently treat with them as a legal assembly, yet he would be very glad to confer with any of the members in their private capacity; setting forth at the same time the nature and extent of his powers as commissioner. But the congress were not as yet sufficiently humbled to derogate in the least from the dignity of character they had assumed. They replied, that the congress of the free and independent states of America could not consistently send any of its members in another capacity than that which they had publicly assumed; but as they were extremely desirous of restoring peace to their country upon equitable conditions, they would appoint a committee of their body to wait upon him, and learn what proposals he had to make.

This produced a new conference. The committee appointed by congress was composed of Dr Franklin, Mr Adams, and Mr Rutledge. They were very politely received by his Lordship; but the conference proved as fruitless as before independency had been declared; and the final answer of the deputies was, that they were extremely willing to enter into any treaty with Great Britain that might conduce to the good of both nations, but that they would not treat in any other character than that of independent states. This positive declaration instantly put an end to all hopes of reconciliation; and it was resolved to prosecute the war with the utmost vigour. Lord Howe, after publishing a manifesto, in which he declared the refusal of congress, and that he himself was willing to confer with all well disposed persons about the means of restoring public tranquillity, set about the most proper methods for reducing the city of New York. Here the provincial troops were posted, and from a great number of batteries kept continually annoying the British shipping. The East River lay between them, of about 1200 yards in breadth, which the British troops were extremely desirous of passing. At last the ships having, after an incessant cannonade of several days, silenced the most troublesome batteries, a body of troops was sent up the river to a bay, about three miles distant, where the fortifications were less strong than in other places. Here having driven off the provincials by the cannon of the fleet, they marched directly towards the city; but the enemy finding that they should now be attacked on all sides, abandoned the city, and retired to the north of the island, where their principal force was collected. In their passage thither they skirmished with the British, but carefully avoided a general engagement; and it was observed that they did not behave with that ardour and impetuous valour which had hitherto marked their character.

The British and provincial armies were not now above two miles distant from each other. The former lay encamped from shore to shore for an extent of two miles, being the breadth of the island, which though 15 miles long, exceeds not two in any part in breadth. The provincials, who lay directly opposite, had strengthened

America.
249
Lord
Howe sends
a message
to con-
gress,

250
And is
waited on
by a com-
mittee.

251
The confe-
rence ter-
minates in-
effectually.

252
New York
abandoned
by the pro-
vincials.

253
Situation
of the Bri-
tish and
American
armies.

²⁵⁴ America. ened their camp with many fortifications; at the same time, being masters of all the passes and defiles betwixt the two camps, they were enabled to defend themselves against an army much more numerous than their own; and they had also strongly fortified a pass called *King's Bridge*, whence they could secure a passage to the continent in case of any misfortune. Here General Washington, in order to inure the provincials to actual service, and at the same time to annoy the enemy as much as possible, employed his troops in continual skirmishes; by which it was observed that they soon recovered their spirits, and behaved with their usual boldness.

As the situation of the two armies was now highly inconvenient for the British generals, it was resolved to make such movements as might oblige General Washington to relinquish his strong situation. The possession of New York had been less beneficial than was expected. It had been concerted among the provincials, that the city should be burnt at the time of evacuation; but as they were forced to depart with precipitation, they were prevented from putting the scheme in execution. In a few days, however, it was attempted by some who had been left behind for that purpose. Taking advantage of a high wind and dry weather, the town was set on fire in several places at once, by means of combustibles properly placed for that purpose; and notwithstanding the most active exertions of the soldiery and sailors, a fourth part of the city was consumed.

On this occasion the British were irritated to the highest degree; and many persons, said to be incendiaries, were without mercy thrown into the flames. It was determined to force the provincial army to a greater distance, that they might have it less in their power, by any emissaries, to engage others in a similar attempt. For this purpose, Gen. Howe having left Lord Percy with sufficient force to garrison New York, he embarked his army in flat-bottomed boats, by which they were conveyed thro' the dangerous passage called *Hell Gate*, and landed near the town of West Chester, lying on the continent towards Connecticut. Here having received a supply of men and provisions, they moved to New Rochelle, situated on the sound which separates Long Island from the continent. After this, receiving still fresh reinforcements, they made such movements as threatened to distress the provincials very much, by cutting off their convoys of provisions from Connecticut, and thus force them to an engagement. This, however, General Washington determined at all events to avoid. He therefore extended his forces into a long line opposite to the way in which the enemy marched, keeping the Bruna, a river of considerable magnitude, between the two armies, with the North River on his rear. Here again the provincials continued for some time to annoy and skirmish with the Royal army, until at last, by some other manœuvres,

²⁵⁶ Is defeated at the White Plains. the British general found means to attack them advantageously at a place called the *White Plains*, and drove them from some of their posts. The victory on this occasion was much less complete than the former; however it obliged the provincials once more to shift their ground, and to retreat farther up the country. General Howe pursued for some time; but at last finding all his endeavours vain to bring the Americans to a pitched battle, he determined to give over such an useless chase,

and employ himself in reducing the forts which the provincials still retained in the neighbourhood of New York. In this he met with the most complete success. The Americans, on the approach of the king's forces, retreated from King's Bridge into Fort Washington; and this, as well as Fort Lee, which lay in the neighbourhood, was quickly reduced, though the garrison made their escape. Thus the Jerseys were laid entirely open to the incursions of the British troops; and so fully were these provinces taken possession of by the Royal army, that its winter-quarters extended from New Brunswick to the river Delaware. Had any number of boats been at hand, it is probable that Philadelphia would now have fallen into their hands. All these, however, had been carefully removed by the Americans. In lieu of this enterprise, Sir Henry Clinton undertook an expedition to Rhode Island, and became master of it without losing a man. His expedition was also attended with this further advantage, that the American fleet under Commodore Hopkins was obliged to sail as far as possible up the river Providence, and thus remained entirely useless.

The same ill success continued to attend the Americans in other parts. After their expulsion from Canada, they had crossed the lake Champlain, and taken up their quarters at Crown Point, as we have already mentioned. Here they remained for some time in safety, as the British had no vessels on the lake, and consequently General Burgoyne could not pursue them. To remedy this deficiency, there was no possible method, but either to construct vessels on the spot, or take to pieces some vessels already constructed, and drag them up the river into the lake. This, however, was effected in no longer a space than three months; and the British general, after incredible toil and difficulty, saw himself in possession of a great number of vessels, by which means he was enabled to pursue his enemies, and invade them in his turn. The labour undergone at this time by the sea and land forces must indeed have been prodigious; since there were conveyed over land, and dragged up the rapids of St Laurence, no fewer than 30 large long-boats, 400 batteaux, besides a vast number of flat-bottomed boats, and a gondola of 30 tons. The intent of the expedition was to push forward before winter to Albany, where the army would take up its winter-quarters, and next spring effect a junction with that under General Howe, when it was not doubted that the united force and skill of these two commanders would speedily put a termination to the war.

By reason of the difficulties with which the equipment of this fleet had been attended, it was the beginning of October before the expedition could be undertaken. It was now, however, by every judge allowed to be completely able to answer the purpose for which it was intended. It consisted of one large vessel with three masts, carrying 18 twelve-pounders; two schooners, the one carrying 14, the other 12 six-pounders; a large flat-bottomed radeau with 6 twenty-four and 6 twelve-pounders; and a gondola with 8 nine-pounders. Besides these were 20 vessels of a smaller size, called *gun-boats*, carrying each a piece of brass ordnance from nine to 24 pounders, or howitzers. Several long-boats were fitted out in the same manner; and besides all these, there was a vast number of boats and tenders of

America. of various sizes, to be used as transports for the troops and baggage. It was manned by a number of select seamen, and the guns were to be served by a detachment from the corps of artillery; the officers and soldiers appointed for this expedition were also chosen out of the whole army.

260
Destroy
the naval
force of
the pro-
vincials.

To oppose this formidable armament the Americans had only a very inconsiderable force, commanded by General Arnold; who, after engaging part of the British fleet for a whole day, took advantage of the darkness of the night to set sail without being perceived, and next morning was out of sight: but he was so hotly pursued by the British, that on the second day after he was overtaken, and forced to a second engagement. In this he behaved with great gallantry; but his force being very inferior to that of the enemy, he was obliged to run his ships ashore and set them on fire. A few only escaped to Lake George; and the garrison of Crown Point having destroyed or carried off every thing of value, retired to Ticonderago. Thither General Carleton intended to have pursued them; but the difficulties he had to encounter appeared so many and so great, that it was thought proper to march back into Canada, and desist from any further operations till next spring.

261
The Ame-
ricans al-
most en-
tirely dis-
persed.

Thus the affairs of the Americans seemed every where going to wreck: even those who had been most sanguine in their cause began to waver. The time, also, for which the soldiers had enlisted themselves was now expired; and the bad success of the preceding campaign had been so very discouraging, that no person was willing to engage himself during the continuance of a war, of which the event seemed to be so doubtful. In consequence of this, therefore, General Washington found his army daily decreasing in strength; so that from 30,000, of whom it consisted when General Howe landed on Staten Island, scarce a tenth-part could now be mustered. To assist the chief commander as much as possible, General Lee had collected a body of forces in the north; but on his way southward, having imprudently taken up his lodging at some distance from his troops, information was given to Colonel Harcourt, who happened at that time to be in the neighbourhood, and Lee was made prisoner.

262
General
Lee taken
prisoner.

The loss of this general was much regretted, the more especially as he was of superior quality to any prisoner in the possession of the colonists, and could not therefore be exchanged. Six field-officers were offered in exchange for him and refused; and the congress was highly irritated at its being reported that he was to be treated as a deserter, having been a half-pay officer in the British service at the commencement of the war. In consequence of this they issued a proclamation, threatening to retaliate on the prisoners in their possession whatever punishment should be inflicted on any of those taken by the British, and especially that their conduct should be regulated by the treatment of General Lee.

263
Continent-
al army
for 1777.

In the mean time they proceeded with the most indefatigable diligence to recruit their army, and bound their soldiers to serve for a term of three years, or during the continuance of the war. The army designed for the ensuing campaign, was to consist of 88 battalions; of which each province was to contribute its quota; and 20 dollars were offered as a bounty to

each soldier, besides an allotment of lands at the end of the war. In this allotment it was stipulated, that each soldier should have 100 acres; an ensign 150; a lieutenant 200; a captain 300; a major 400; a lieutenant-colonel 450; and a colonel 500. No lands were promised to those who enlisted only for three years. All officers or soldiers disabled through wounds received in the service were to enjoy half-pay during life. To defray the expence, congress borrowed five millions of dollars at five per cent.; for payment of which the United States became surety. At the same time, in order to animate the people to vigorous exertions, a declaration was published, in which they set forth the necessity there was for taking proper methods to insure success in their cause: they endeavoured to palliate as much as possible the misfortunes which had already happened; and represented the true cause of the present distress to be the short term of enlistment.

This declaration, together with the imminent danger of Philadelphia, determined the Americans to exert themselves to the utmost in order to reinforce General Washington's army. They soon received farther encouragement, however, by an exploit of that general against the Hessians. As the Royal army extended in different cantonments for a great way, Gen. Washington, perceiving the imminent danger to which Philadelphia was exposed, resolved to make some attempt on those divisions of the enemy which lay nearest that city. These happened to be the Hessians, who lay in three divisions, the last only 20 miles distant from Philadelphia. On the 25th of December, having collected as considerable a force as he could, he set out with an intent to surprise that body of the enemy who lay at Trenton. His army was divided into three bodies; one of which he ordered to cross the Delaware at Trenton Ferry, a little below the town; the second at a good distance below, at a place called *Bordentown*, where the second division of Hessians was placed; while he himself, with the third, directing his course to a ferry some miles above Trenton, intended to have passed it at midnight, and attack the Hessians at break of day. But by reason of various impediments, it was eight in the morning before he could reach the place of his destination. The enemy, however, did not perceive his approach till they were suddenly attacked. Colonel Ralle, who commanded them, did all that could be expected from a brave and experienced officer; but every thing was in such confusion, that no efforts of valour or skill could now retrieve matters. The colonel himself was mortally wounded, his troops were entirely broken, their artillery seized, and about 1000 taken prisoners.

This action, though seemingly of no very decisive nature, was sufficient at that time to turn the fortune of war in favour of America. It tended greatly to lessen the fear which the provincials had of the Hessians, at the same time that it equally abated the confidence which the British had till now put in them. Reinforcements came into General Washington's army from all quarters; so that he was soon in a condition to leave Philadelphia, and take up his quarters at Trenton. Emboldened by his success, he determined to make an attempt on a division of the British forces stationed at Maidenhead, a town situated half way between Trenton and Princetown. This consisted of three regiments

America.

264
Another
attempt
on three
British re-
giments.

²⁶⁵ **America.** under the command of Colonel Mawhood, an officer of great merit. The troops were surprised on their march; but though they were separately surrounded and attacked by a force so vastly superior, they charged the enemy so resolutely with their bayonets, that they effected a retreat. These attempts of the Americans, however, with the hostile disposition of the people, showed the impossibility of maintaining posts so far advanced in the enemy's country; so that it was resolved to retreat towards Brunswick, in order to prevent it, with the troops and magazines it contained, from falling into the hands of the provincials. General Washington lost no opportunity of recovering what had been lost; and by dividing his army into small parties, which could be reunited on a few hours warning, he in a manner entirely covered the country with it, and repossessed himself of all the important places.

Thus ended the campaign of 1776, with scarce any real advantage other than the acquisition of the city of New York, and of a few fortresses in its neighbourhood; where the troops were constrained to act with as much circumspection as if they had been besieged by a victorious army, instead of being themselves the conquerors.

²⁶⁶ **Excursions of the British from New York.** The army at New York began in 1777 to exercise a kind of predatory war, by sending out parties to destroy magazines, make incursions, and take or destroy such forts as lay on the banks of rivers, to which their great command of shipping gave them access. In this they were generally successful: the provincial magazines at Peek's Hill, a place of about 50 miles distant from New York, were destroyed, the town of Dunbury in Connecticut burnt, and that of Ridgefield in the same province was taken possession of. In returning from the last expedition, however, the British were greatly harassed by the enemy under Generals Arnold, Wooster, and Sullivan; but they made good their retreat in spite of all opposition, with the loss of only 170 killed and wounded. On the American side the loss was much greater; General Wooster was killed, and Arnold in the most imminent danger. On the other hand, the Americans destroyed the stores at Saggharbour, in Long Island, and made prisoners of all who defended the place.

As this method of making war, however, could answer but little purpose, and favoured more of the barbarous incursions of savages than of a war carried on by a civilized people, it was resolved to make an attempt on Philadelphia. At first it was thought that this could be done through the Jerseys; but General Washington had received such large reinforcements, and posted himself so strongly, that it was found to be impracticable. Many stratagems were used to draw him from this strong situation, but without success; so that it was found necessary to make the attempt on Philadelphia by sea. While the preparations necessary for this expedition were going forward, the Americans found means to make amends for the capture of General Lee by that of General Prescott, who was seized in his quarters with his aid-de-camp, in much the same manner as General Lee had been. This was exceedingly mortifying to the General himself, as he had not long before set a price upon General Arnold, by offering a sum of money to any one that apprehended

him; which the latter answered by setting a lower price upon General Prescott.

The month of July was far advanced before the preparations for the expedition against Philadelphia were completed; and it was the 23d before the fleet was able to sail from Sandy Hook. The force employed in this expedition consisted of 36 battalions of British and Hessians, a regiment of light horse, and a body of loyalists raised at New York. The remainder of these, with 17 battalions, and another body of light horse, were stationed at New York under Sir Henry Clinton. Seven battalions were stationed at Rhode Island. After a week's sailing they arrived at the mouth of the Delaware; but there received certain intelligence, that the navigation of the river was so effectually obstructed, that no possibility of forcing a passage remained. Upon this it was resolved to proceed farther southward to Chesapeak Bay in Maryland, from whence the distance to Philadelphia was not very great, and where the provincial army would find less advantage from the nature of the country than in the Jerseys.

The navigation from Delaware to Chesapeak took up the best part of the month of August, and that up the bay itself was extremely difficult and tedious. At last, having sailed up the river Elk, as far as was practicable, the troops were landed without opposition, and set forward on their intended expedition. On the news of their arrival in Chesapeak, General Washington left the Jerseys, and hastened to the relief of Philadelphia; and in the beginning of September met the Royal army at Brandy-wine Creek about mid-day, between the head of the Elk and Philadelphia. Here he adhered to his former method of skirmishing and harassing the Royal army on its march; but as this proved insufficient to stop its progress, he retired to that side of the Creek next to Philadelphia, with an intent to dispute the passage. This brought on a general engagement on the 11th September, in which the Americans were worsted through the superior discipline of the British troops; and it was only through the approach of night that they were saved from being entirely destroyed. On this occasion the provincials lost about 1000 in killed and wounded, besides 400 taken prisoners.

The loss of this battle proved also the loss of Philadelphia. General Washington retired towards Lancaster, an inland town, at a considerable distance from Philadelphia. Here, however, the British general took such measures as must have forced the provincials to a second engagement; but a violent rain which lasted a day and a night prevented his design. General Washington, though he could not prevent the loss of Philadelphia, still adhered to his original plan of distressing the Royal party, by laying ambushes and cutting off detached parties: but in this he was less successful than formerly; and one of his own detachments which lay in ambush in a wood were themselves surprised and entirely defeated, with the loss of 300 killed and wounded, besides a great number taken, and all their arms and baggage.

General Howe now perceiving that the Americans would not venture another battle even for the sake of their capital, took peaceable possession of it on the 26th of September. His first care was then to cut off, by means of strong batteries, the communication

But they make good their retreat.

²⁶⁸ The fleet sails for Philadelphia.

²⁶⁹ The army lands at the head of the Elk.

²⁷⁰ Americans defeated.

²⁷¹ An American detachment surprised and defeated with great slaughter.

²⁷² General Howe takes possession of Philadelphia.

America. between the upper and lower parts of the river; which was executed notwithstanding the opposition of some American armed vessels; one of which, carrying 36 guns, was taken. His next task was to open a communication with it by sea; and this was a work of no small difficulty. A vast number of batteries and forts had been erected, and immense machines formed like *chevaux de frize*, from whence they took their name, sunk in the river to prevent its navigation. As the fleet was sent round to the mouth of the river in order to co-operate with the army, this work, however difficult, was accomplished; nor did the provincials give much opposition, as well knowing that all places of this kind were now untenable. General

273 **Royal army attack- ed at Germantown.** Washington, however, took the advantage of the Royal army being divided to attack the camp of the principal division of it that lay at German-town in the neighbourhood of Philadelphia. In this he met with very little success; for though he reached the place of destination by three o'clock in the morning, the patrols had time to call the troops to arms. The Americans, notwithstanding, made a very resolute attack: but they were received with such bravery, that they were compelled to abandon the attempt, and retreat in great disorder; with the advantage, however, of carrying off their cannon, though pursued for a considerable way, after having 300 killed, 600 wounded, and upwards of 400 taken prisoners, among whom were 54 officers. On the British side, the loss amounted to 430 wounded and prisoners, and 70 killed; but among the last were General Agnew and Colonel Bird, with some other excellent officers.

There still remained two strong forts on the Delaware to be reduced. These were Mud Island and Red Bank. The various obstructions which the Americans had thrown in the way rendered it necessary to bring up the *Augusta*, a ship of the line, and the *Merlin* frigate, to the attack of Mud Island; but during the heat of action both were grounded. Upon this, the Americans sent down four fire-ships, and directed the whole fire from their galleys against them. The former were rendered ineffectual by the courage and skill of the British seamen; but during the engagement both the *Augusta* and *Merlin* took fire and were burnt to ashes, and the other ships obliged to withdraw. The enemy, encouraged by this unsuccessful attempt, proceeded to throw new obstructions in the way; but the British general having found means to convey a number of cannon and to erect batteries within a gunshot of the fort by land, and bringing up three ships of the line which mounted heavy cannon, the garrison, after making a vigorous defence for one day, perceiving that preparations were making for a general assault on the next, abandoned the place in the night. Those who defended Red Bank followed their example, and abandoned it on the approach of Lord Cornwallis. A great number of the American shipping now finding themselves entirely destitute of any protection, sailed up the river in the night-time. Seventeen, however, remained, whose retreat was intercepted by a frigate and some armed vessels; on which the Americans ran them ashore and burnt them, to prevent their falling into the enemy's hands.

276 **All the forts near Philadelphia reduced.** Thus the campaign of 1777 in Pennsylvania concluded successfully on the part of the British. In the

north, however, matters wore a different aspect. The **America.** expedition in that quarter had been projected by the British ministry as the most effectual method that could be taken to crush the colonies at once. The four provinces of New England had originally begun the confederacy against Britain, and were still considered as the most active in the continuation of it; and it was thought, that any impression made upon them would contribute in an effectual manner to the reduction of all the rest. For this purpose, an army of 4000 chosen British troops and 3000 Germans were put under the command of General Burgoyne; General Carleton was directed to use his interest with the Indians to persuade them to join in this expedition; and the province of Quebec was to furnish large parties to join in the same. The officers who commanded under General Burgoyne were General Philips of the artillery, Generals Frazer, Powell, and Hamilton, with the German officers Generals Reidesel and Specht. The soldiers, as has already been observed, were all excellently disciplined, and had been kept in their winter-quarters with all imaginable care, in order to prepare them for the expedition on which they were going. To aid the principal expedition, another was projected on the Mohawk River under Colonel St Leger, who was to be assisted by Sir John Johnson, son to the famous Sir William Johnson, who had so greatly distinguished himself in the war of 1755.

277 **Expedition projected against New England.** On the 21st of June 1777, the army encamped on the western side of the Lake Champlain; where being joined by a considerable body of Indians, General Burgoyne made a speech, in which he exhorted these new allies to lay aside their ferocious and barbarous manner of making war; to kill only such as opposed them in arms; and to spare prisoners, with such women and children as should fall into their hands. After issuing a proclamation, in which the force of Britain and that which he commanded was set forth in very ostentatious terms, the campaign opened with the siege of Ticonderoga. The place was very strong, and garrisoned by 6000 men under General Sinclair; nevertheless, the works were so extensive that even this number was scarce sufficient to defend them properly. They had therefore omitted to fortify a rugged eminence called *Sugar Hill*, the top of which overlooked and effectually commanded the whole works; vainly imagining that the difficulty of the ascent would be sufficient to prevent the enemy from taking possession of it. On the approach of the first division of the army, the provincials abandoned and set fire to their outworks; and so expeditious were the British troops, that by the 5th of July every post was secured which was judged necessary for investing it completely. A road was soon after made to the very summit of that eminence which the Americans had with such confidence supposed could not be ascended; and so much were they now disheartened, that they instantly abandoned the fort entirely, taking the road to Skenesborough, a place to the south of Lake George; while their baggage, with what artillery and military stores they could carry off, were sent to the same place by water. But the British generals were determined not to let them pass so easily. Both were pursued and both overtaken. Their armed vessels consisted only of five galleys; two of which were taken, and three blown up; on which they set fire to their

278 **General Burgoyne joined by the Indians.**
279 **Ticonderoga besieged and taken.**
280 **Americans defeated by land and water.**

America. their boats and fortifications at Skenesborough. On this occasion the provincials lost 200 boats, 130 pieces of cannon, with all their provisions and baggage. Their land-forces under Colonel Francis made a brave defence against General Frazer; and being greatly superior in number, had almost overpowered him, when General Reidesel with a large body of Germans came to his assistance. The enemy were now overpowered in their turn; and their commander being killed, they fled on all sides with great precipitation. In this action 200 Americans were killed, as many taken prisoners, and above 600 wounded, many of whom perished in the woods for want of assistance.

During the engagement General Sinclair was at Castleton, about six miles from the place; but instead of going forward to Fort Anne, the next place of strength, he repaired to the woods which lie between that fortress and New England. General Burgoyne, however, detached Colonel Hill with the ninth regiment, in order to intercept such as should attempt to retreat towards Fort Anne. On his way he met with a body of the enemy, said to be six times as numerous as his own; but after an engagement of three hours, they were obliged to retire with great loss. After so many disasters, despairing of being able to make any stand at Fort Anne, they set fire to it and retired to Fort Edward. In all these engagements the loss of killed and wounded in the Royal army did not exceed 200 men.

282 General Burgoyne was now obliged to suspend his operations for some time, and wait at Skenesborough for the arrival of his tents, provisions, &c. but employed this interval in making roads through the country about St Anne, and in clearing a passage for his troops to proceed against the enemy. This was attended with incredible toil; but all obstacles were surmounted with equal patience and resolution by the army. In short, after undergoing the utmost difficulty that could be undergone, and making every exertion that man could make, he arrived with his army before Fort Edward about the end of July. Here General Schuyler had been for some time endeavouring to recruit the shattered American forces, and had been joined by General Sinclair with the remains of his army; the garrison of Fort George also, situated on the lake of that name, had evacuated the place and retired to Fort Edward.

283 But on the approach of the Royal army, they retired from thence also, and formed their headquarters at Saratoga. Notwithstanding the great successes of the British general, they showed not the least disposition to submit, but seemed only to consider how they might make the most effectual resistance. For this purpose, the militia was every where raised and draughted to join the army at Saratoga; and such numbers of volunteers were daily added, that they soon began to recover from the terror into which they had been thrown. That they might have a commander whose abilities could be relied on, General Arnold was appointed, who repaired to Saratoga with a considerable train of artillery; but receiving intelligence that Colonel St Leger was proceeding with great rapidity in his expedition on the Mohawk River, he removed to Still-water, a place about half-way between Saratoga and the junction of the Mohawk and Hudson's River. The Colo-

nel, in the mean time, had advanced as far as Fort Stanwix; the siege of which he pressed with great vigour. On the 6th of August, understanding that a supply of provisions, escorted by 800 or 900 men, was on the way to the fort, he dispatched Sir John Johnson with a strong detachment to intercept it. This he did so effectually, that, besides intercepting the provisions, 400 of its guard were slain, 200 taken, and the rest escaped with great difficulty. The garrison, however, were not to be intimidated by this disaster, nor by the threats or representations of the Colonel; on the contrary, they made several successful sallies under Colonel Willet, the second in command; and this gentleman, in company with another, even ventured out of the fort, and, eluding the vigilance of the enemy, passed through them in order to hasten the march of General Arnold to their assistance.

Thus the affairs of Colonel St Leger seemed to be in no very favourable situation notwithstanding his late success, and they were soon totally ruined by the desertion of the Indians. They had been alarmed by the report of General Arnold's advancing with 2000 men to the relief of the fort; and while the Colonel was attempting to give them encouragement, another report was spread, that General Burgoyne had been defeated with great slaughter, and was now flying before the provincials. On this he was obliged to do as they thought proper; and the retreat could not be effected without the loss of the tents and some of the artillery and military stores.

General Burgoyne, in the mean time, notwithstanding all the difficulties he had already sustained, found that he must still encounter more. The roads he had made with so much labour and pains were destroyed either by the wetness of the season or by the enemy; so that the provisions he brought from Fort George could not arrive at his camp without the most prodigious toil. On hearing of the siege of Fort Stanwix by Colonel St Leger, he determined to move forward, in hopes of inclosing the enemy betwixt his own army and that of St Leger, or of obtaining the command of all the country between Fort Stanwix and Albany; or at any rate, a junction with Colonel St Leger would be effected, which could not but be attended with the most happy consequences. The only difficulty was the want of provisions; and this it was proposed to remedy by reducing the provincial magazines at Bennington. For this purpose, Colonel Baum, a German officer of great bravery, was chosen with a body of 500 men. The place was about 20 miles from Hudson's River; and to support Colonel Baum's party, the whole army marched up the river's bank, and encamped almost opposite to Saratoga, with the river betwixt it and that place. An advanced party was posted at Battle Kill, between the camp and Bennington, in order to support Colonel Baum. In their way the British seized a large supply of cattle and provisions, which were immediately sent to the camp; but the badness of the roads retarded their march so much, that intelligence of their design was sent to Bennington. Understanding now that the American force was greatly superior to his own, the Colonel acquainted the General, who immediately dispatched Colonel Breyman with a party to his assistance; but through the same causes that had retarded the march of Colonel Baum, this assistance-

284
Fort Stanwix besieged.

285
A detachment of Americans cut in pieces.

286
The Indians deserted, and forced the colonel to raise the siege.

287
General Burgoyne distressed for want of provisions.

288
Makes an attempt on the provincial magazines at Bennington.

281
They are again defeated, and abandon Fort Anne.

America assistance could not arrive in time. General Starke, in the mean time, who commanded at Bennington, determined to attack the two parties separately; and for this purpose advanced against Colonel Baum, whom he surrounded on all sides and attacked with the utmost violence. The troops defended themselves with great valour, but were to a man either killed or taken. Colonel Breyman, after a desperate engagement, had the good luck to effect a retreat through the darkness of the night, which otherwise he could not have done, as his men had expended all their ammunition, being 40 rounds to each.

General Burgoyne, thus disappointed in his attempt on Bennington, applied himself with indefatigable diligence to procure provisions from Fort George; and having at length amassed a sufficient quantity to last for a month, he threw a bridge of boats over the river Hudson, which he crossed about the middle of September, encamping on the hills and plains near Saratoga. As soon as he approached the provincial army, at this time encamped at Stillwater under General Gates, he determined to make an attack; for which purpose he put himself at the head of the central division of his army, having General Frazer and Colonel Breyman on the right, with Generals Reidesel and Philips on the left. In this position he advanced towards the enemy on the 19th of September. But the Americans did not now wait to be attacked: on the contrary, they attacked the central division with the utmost violence; and it was not until General Philips with the artillery came up that they could be repulsed. On this occasion, though the British troops lost only 330 in killed and wounded, and the enemy no fewer than 1500, the former were very much alarmed at the obstinate resolution shown by the Americans. This did not, however, prevent them from advancing towards the enemy, and posting themselves the next day within cannon-shot of their lines. But their allies the Indians began to desert in great numbers; and at the same time the general was in the highest degree mortified by having no intelligence of any assistance from Sir Henry Clinton, as had been stipulated. He now received a letter from him, by which he was informed that Sir Henry intended to make a diversion on the North River in his favour. This afforded but little comfort: however, he returned an answer by several trusty persons whom he dispatched different ways, stating his present distressed situation, and mentioning that the provisions and other necessaries he had would only enable him to hold out till the 12th of October.

In the mean time the Americans, in order to cut off the retreat of the British army in the most effectual manner, undertook an expedition against Ticonderago; but were obliged to abandon the enterprise after having surprised all the out-posts, and taken a great number of boats with some armed vessels, and a number of prisoners. The army under General Burgoyne, however, continued to labour under the greatest distresses; so that in the beginning of October he had been obliged to diminish the soldiers allowance. On the 7th of that month he determined to move towards the enemy. For this purpose he sent a body of 1500 men to reconnoitre their left wing; intending, if possible, to break through it in order to effect a retreat. The detachment, however, had not proceeded far when a

dreadful attack was made upon the left wing of the British army, which was with great difficulty preserved from being entirely broken by a reinforcement brought up by General Frazer, who was killed in the attack. After the troops had with the most desperate efforts regained their camp, it was most furiously assaulted by General Arnold; who, notwithstanding all opposition, would have forced the entrenchments, had he not received a dangerous wound, which obliged him to retire. Thus the attack failed on the left, but on the right the camp of the German reserve was forced, Colonel Breyman killed, and his countrymen defeated with great slaughter and the loss of all their artillery and baggage.

This was by far the heaviest loss the British army had sustained since the action at Bunker's Hill. The list of killed and wounded amounted to near 1200, exclusive of the Germans; but the greatest misfortune was, that the enemy had now an opening on the right and rear of the British forces, so that the army was threatened with entire destruction. This obliged General Burgoyne once more to shift his position, that the enemy might also be obliged to alter theirs. This was accomplished on the night of the 7th, without any loss, and all the next day he continued to offer the enemy battle; but they were now too well assured of obtaining a complete victory, by cutting off all supplies from the British, to risk a pitched battle. Wherefore they advanced on the right side, in order to inclose him entirely; which obliged the General to direct a retreat towards Saratoga. But the enemy had now stationed a great force on the ford at Hudson's river, so that the only possibility of retreat was by securing a passage to Lake George; and to effect this, a body of workmen were detached, with a strong guard, to repair the roads and bridges that led to Fort Edward. As soon as they were gone, however, the enemy seemed to prepare for an attack; which rendered it necessary to recal the guard, and the workmen being of course left exposed could not proceed.

In the mean time, the boats which conveyed provisions down Hudson's river were exposed to the continual fire of the American marksmen, who took many of them; so that it became necessary to convey the provisions over land. In this extreme danger, it was resolved to march by night to Fort Edward, forcing the passages at the fords either above or below the place; and in order to effect this the more easily, it was resolved that the soldiers should carry their provisions on their backs, leaving behind their baggage and every other incumbrance. But before this could be executed, intelligence was received that the enemy had raised strong entrenchments opposite to these fords, well provided with cannon, and that they had likewise taken possession of the rising ground between Fort George and Fort Edward, which in like manner was provided with cannon.

All this time the American army was increasing by the continual arrival of militia and volunteers from all parts. Their parties extended all along the opposite bank of Hudson's River, and some had even passed it in order to observe the least movement of the British army. The whole force under General Gates was computed at 16,000 men, while the army under General Burgoyne scarce amounted to 6000; and every part of

the American army, which was with great difficulty preserved from being entirely broken by a reinforcement brought up by General Frazer, who was killed in the attack. After the troops had with the most desperate efforts regained their camp, it was most furiously assaulted by General Arnold; who, notwithstanding all opposition, would have forced the entrenchments, had he not received a dangerous wound, which obliged him to retire. Thus the attack failed on the left, but on the right the camp of the German reserve was forced, Colonel Breyman killed, and his countrymen defeated with great slaughter and the loss of all their artillery and baggage.

This was by far the heaviest loss the British army had sustained since the action at Bunker's Hill. The list of killed and wounded amounted to near 1200, exclusive of the Germans; but the greatest misfortune was, that the enemy had now an opening on the right and rear of the British forces, so that the army was threatened with entire destruction. This obliged General Burgoyne once more to shift his position, that the enemy might also be obliged to alter theirs. This was accomplished on the night of the 7th, without any loss, and all the next day he continued to offer the enemy battle; but they were now too well assured of obtaining a complete victory, by cutting off all supplies from the British, to risk a pitched battle. Wherefore they advanced on the right side, in order to inclose him entirely; which obliged the General to direct a retreat towards Saratoga. But the enemy had now stationed a great force on the ford at Hudson's river, so that the only possibility of retreat was by securing a passage to Lake George; and to effect this, a body of workmen were detached, with a strong guard, to repair the roads and bridges that led to Fort Edward. As soon as they were gone, however, the enemy seemed to prepare for an attack; which rendered it necessary to recal the guard, and the workmen being of course left exposed could not proceed.

In the mean time, the boats which conveyed provisions down Hudson's river were exposed to the continual fire of the American marksmen, who took many of them; so that it became necessary to convey the provisions over land. In this extreme danger, it was resolved to march by night to Fort Edward, forcing the passages at the fords either above or below the place; and in order to effect this the more easily, it was resolved that the soldiers should carry their provisions on their backs, leaving behind their baggage and every other incumbrance. But before this could be executed, intelligence was received that the enemy had raised strong entrenchments opposite to these fords, well provided with cannon, and that they had likewise taken possession of the rising ground between Fort George and Fort Edward, which in like manner was provided with cannon.

All this time the American army was increasing by the continual arrival of militia and volunteers from all parts. Their parties extended all along the opposite bank of Hudson's River, and some had even passed it in order to observe the least movement of the British army. The whole force under General Gates was computed at 16,000 men, while the army under General Burgoyne scarce amounted to 6000; and every part of

the American army, which was with great difficulty preserved from being entirely broken by a reinforcement brought up by General Frazer, who was killed in the attack. After the troops had with the most desperate efforts regained their camp, it was most furiously assaulted by General Arnold; who, notwithstanding all opposition, would have forced the entrenchments, had he not received a dangerous wound, which obliged him to retire. Thus the attack failed on the left, but on the right the camp of the German reserve was forced, Colonel Breyman killed, and his countrymen defeated with great slaughter and the loss of all their artillery and baggage.

This was by far the heaviest loss the British army had sustained since the action at Bunker's Hill. The list of killed and wounded amounted to near 1200, exclusive of the Germans; but the greatest misfortune was, that the enemy had now an opening on the right and rear of the British forces, so that the army was threatened with entire destruction. This obliged General Burgoyne once more to shift his position, that the enemy might also be obliged to alter theirs. This was accomplished on the night of the 7th, without any loss, and all the next day he continued to offer the enemy battle; but they were now too well assured of obtaining a complete victory, by cutting off all supplies from the British, to risk a pitched battle. Wherefore they advanced on the right side, in order to inclose him entirely; which obliged the General to direct a retreat towards Saratoga. But the enemy had now stationed a great force on the ford at Hudson's river, so that the only possibility of retreat was by securing a passage to Lake George; and to effect this, a body of workmen were detached, with a strong guard, to repair the roads and bridges that led to Fort Edward. As soon as they were gone, however, the enemy seemed to prepare for an attack; which rendered it necessary to recal the guard, and the workmen being of course left exposed could not proceed.

In the mean time, the boats which conveyed provisions down Hudson's river were exposed to the continual fire of the American marksmen, who took many of them; so that it became necessary to convey the provisions over land. In this extreme danger, it was resolved to march by night to Fort Edward, forcing the passages at the fords either above or below the place; and in order to effect this the more easily, it was resolved that the soldiers should carry their provisions on their backs, leaving behind their baggage and every other incumbrance. But before this could be executed, intelligence was received that the enemy had raised strong entrenchments opposite to these fords, well provided with cannon, and that they had likewise taken possession of the rising ground between Fort George and Fort Edward, which in like manner was provided with cannon.

All this time the American army was increasing by the continual arrival of militia and volunteers from all parts. Their parties extended all along the opposite bank of Hudson's River, and some had even passed it in order to observe the least movement of the British army. The whole force under General Gates was computed at 16,000 men, while the army under General Burgoyne scarce amounted to 6000; and every part of

America. the camp was reached by the grape and rifle-shot of the enemy, besides a discharge from their artillery, which was almost incessant. In this state of extreme distress and danger, the army continued with the greatest constancy and perseverance till the evening of the 13th of October, when an inventory of provisions being taken, it was found that no more remained than what were sufficient to serve for three days; and a council of war being called, it was unanimously determined that there was no method now remaining but to treat with the enemy. In consequence of this, a negociation was opened next day, which speedily terminated in a capitulation of the whole British army; the principal article of which was, that the troops were to have a free passage to Britain, on condition of not serving against America during the war. On this occasion, General Gates ordered his army to keep within their camp while the British foldiers went to a place appointed for them to lay down their arms, that the latter might not have the additional mortification of being made spectacles of so melancholy an event. The number of those who surrendered at Saratoga amounted to 5750, according to the American accounts; the list of sick and wounded left in the camp when the army retreated to Saratoga, to 528; and the number of those lost by other accidents since the taking of Ticonderoga, to near 5000. Thirty-five brass field-pieces, 7000 stand of arms, clothing for an equal number of soldiers, with the tents, military-chest, &c. constituted the booty on this occasion.

302 It is obliged to capitulate.
303 Successful expedition of Sir Henry Clinton. Sir Henry Clinton, in the mean time, had sailed up the North River, and destroyed the two forts called Montgomery and Clinton, with Fort Constitution, and another place called Continental Village, where were barracks for 2000 men. Seventy large cannon were carried away, besides a number of smaller artillery, and a great quantity of stores and ammunition; a large boom and chain reaching across the river from Fort Montgomery to a point of land called St Anthony's Nose, and which cost not less than L. 70,000 Sterling, were partly destroyed and partly carried away, as was also another boom of little less value at Fort Constitution. The loss of the British army was but small in number, though some officers of great merit were killed in the different attacks.

Another attack was made by Sir James Wallace with some frigates, and a body of land forces under General Vaughan. The place which now suffered was named Elopus: the fortifications were destroyed, and the town itself was reduced to ashes, as that called Continental Village had been before.

304 Great dejection on account of Burgoyne's capture. But these successes, of whatever importance they might be, were now disregarded by both parties. They served only to irritate the Americans, flushed with their success; and they were utterly insufficient to raise the spirits of the British, who were now thrown into the utmost dismay.

305 Treaty between France and America. On the 16th of March 1778, Lord North intimated to the house of commons, that a paper had been laid before the king by the French ambassador, intimating the conclusion of an alliance between the court of France and the United States of America. The preliminaries of this treaty had been concluded in the end of the year 1777, and a copy of them sent to congress, in order to counteract any proposals that might be

N^o 15.

made in the mean time by the British ministry. **On America.** the 6th of February 1778, the articles were formally signed, to the great satisfaction of the French nation. They were in substance as follows:

1. If Great Britain should, in consequence of this treaty, proceed to hostilities against France, the two nations should mutually assist one another.

2. The main end of the treaty was in an effectual manner to maintain the independency of America.

3. Should those places of North America still subject to Britain be reduced by the colonies, they should be confederated with them, or subjected to their jurisdiction.

4. Should any of the West India islands be reduced by France, they should be deemed its property.

5. No formal treaty with Great Britain should be concluded either by France or America without the consent of each other; and it was mutually engaged that they should not lay down their arms till the independence of the States had been formally acknowledged.

6. The contracting parties mutually agreed to invite those powers that had received injuries from Great Britain to join the common cause.

7. The United States guaranteed to France all the possessions in the West Indies which she should conquer; and France in her turn guaranteed the absolute independency of the States, and their supreme authority over every country they possessed, or might acquire during the war.

The notification of such a treaty as this could not but be looked upon as a declaration of war. On its being announced to the house, every one agreed in an address to his Majesty, promising to stand by him to the utmost in the present emergency; but it was warmly contended by the members in opposition, that the present ministry ought to be removed on account of their numberless blunders and miscarriages in every instance. Many were of opinion, that the only way to extricate the nation from its trouble was to acknowledge the independency of America at once; and thus we might still do with a good grace what must inevitably be done at last, after expending much more blood and treasure than had yet been lavished in this unhappy contest. The ministerial party, however, entertained different ideas. Instigated by zeal for the national honour, it was determined at once to resent the arrogance of France, and prosecute hostilities against America with more vigour than ever, should the terms now offered them be rejected.

306 Debates occasioned by the treaty. The Americans, in the mean time, assiduously employed their agents at the courts of Spain, Vienna, Prussia, and Tuscany, in order, if possible, to conclude alliances with them, or at least to procure an acknowledgment of their independency. As it had been reported that Britain intended to apply for assistance to Russia, the American commissioners were enjoined to use their utmost influence with the German princes to prevent such auxiliaries from marching through their territories, and to endeavour to procure the recall of the German troops already sent to America. To France they offered a cession of such West India Islands as should be taken by the united strength of France and America; and should Britain by their joint endeavours be dispossessed of Newfoundland, Cape Breton, and Nova

Nova

America. Nova Scotia, these territories should be divided betwixt the two nations, and Great Britain be totally excluded from the fishery. The proposals to the Spanish court were, that in case they should think proper to espouse their quarrel, the American States should assist in reducing Pensacola under the dominion of Spain, provided their subjects were allowed the free navigation of the river Mississippi, and the use of the harbour of Pensacola; and they further offered, that if agreeable to Spain, they would declare war against Portugal, should that power expel the American ships from its ports.

308
General
Burgoyne's
troops de-
tained in
America.
In the mean time, the troops under General Burgoyne were preparing to embark for Britain according to the convention at Saratoga; but to their utter surprise, congress positively refused to allow them to embark, under pretence that some sinister designs were harboured on the part of Britain, and that they only wanted an opportunity to join the other troops at Philadelphia or New York.

309
Predatory
war car-
ried on by
the Bri-
tish troops.
The season for action was now approaching; and congress was indefatigable in its preparations for a new campaign, which it was confidently said would be the last. Among other methods taken for this purpose, it was recommended to all the young gentlemen of the colonies to form themselves into bodies of cavalry to serve at their own expence during the war. Gen. Washington at the same time, in order to remove all incumbrances from his army, lightened the baggage as much as possible, by substituting sacks and portmanteaus in place of chests and boxes, and using pack-horses instead of waggons.

310
Concilia-
tory bill
received
with indig-
nation by
the army.
On the other hand, the British army, expecting to be speedily reinforced by 20,000 men, thought of nothing but concluding the war according to their wishes before the end of the campaign. It was with the utmost concern, as well as indignation, therefore, that they received the news of Lord North's conciliatory bill. It was universally looked upon as a national disgrace; and some even tore the cockades from their hats, and trampled them under their feet as a token of their indignation. By the colonists it was received with indifference. The British commissioners endeavoured to make it as public as possible; and the congress, as formerly, ordered it to be printed in all the newspapers. On this occasion Governor Tryon inclosed several copies of the bill to General Washington in a letter, intreating that he would allow them to be circulated; to which that general returned for answer a copy of a newspaper in which the bill was printed, with the resolutions of congress upon it. These were, That whoever presumed to make a separate agreement with Britain should be deemed a public enemy; that the United States could not with any propriety keep correspondence with the commissioners until their independence was acknowledged, and the British fleets and armies removed from America. At the same time, the colonies were warned not to suffer themselves to be deceived into security by any offers that might be made; but to use their utmost endeavours to send their quotas with all diligence into the field. The individuals with whom the commissioners conversed on the subject of the conciliatory bill, generally returned for answer, that the day of reconciliation was past; and that the haughtiness of Britain had extinguished all filial regard in the breasts of the Americans.

311
Despised
by the co-
lonists.
Despised by the colonists.

About this time also Mr Silas Deane arrived from America, France with two copies of the treaty of commerce and alliance to be signed by congress. Advices of the most agreeable nature were also received from various parts, representing in the most favourable light the dispositions of the European powers; all of whom, it was said, wished to see the independence of America settled upon the most firm and permanent basis. **312**
Considering the situation of matters with the colonists at this time, therefore, it is no wonder that the commissioners found themselves unable to accomplish the errand on which they came. Their proposals were utterly rejected, themselves treated as spies, and all intercourse with them interdicted. **Bad success of the commissioners.**

313
But before any final answer could be obtained from Philadelphia evacuated. congress, Sir Henry Clinton had taken the resolution of evacuating Philadelphia. Accordingly, on the 10th of June, after having made all necessary preparations, the army marched out of the city and crossed the Delaware before noon with all its baggage and other incumbrances. General Washington, apprised of this design, had dispatched expresses into the Jerseys with orders to collect all the force that could be assembled in order to obstruct the march of the enemy. After various movements on both sides, Sir Henry Clinton, with the Royal army, arrived on the 27th of June at a place called Freehold; where, judging that the enemy would attack him, he encamped in a very strong situation. Here General Washington determined to make an attack as soon as the army had again begun its march. The night was spent in making the necessary preparations, and General Lee with his division was ordered to be ready by day-break. But Sir Henry Clinton, justly apprehending that the chief object of the enemy was the baggage, committed it to the care of General Knyphausen, whom he ordered to set out early in the morning, while he followed with the rest of the army. The attack was accordingly made; but the British general had taken such care to arrange his troops properly, and so effectually supported his forces when engaged with the Americans, that the latter not only made no impression, but were with difficulty preserved from a total defeat by the advance of General Washington with the whole army. The British troops effected their retreat with the loss of 300 men, of whom many died through mere fatigue, without any wound. In this action General Lee was charged by General Washington with disobedience and misconduct in retreating before the British army. He was tried by a court-martial, and sentenced to a temporary suspension from his command. After they had arrived at Sandy Hook, a bridge of boats was by Lord Howe's directions thrown from thence over the channel which separated the island from the main land, and the troops were conveyed aboard the fleet; after which they sailed to New York. After sending some light detachments to watch the enemy's motions, General Washington marched towards the North River, where a great force had been collected to join him, and where it was now expected that some very capital operations would take place.

In the mean time, France had set about her preparations for the assistance of the Americans. On the 14th of April Count d'Estaing had sailed from Tou-

America.
314
French
fleet ar-
rives in
America.

lon with a strong squadron of ships of the line and frigates, and arrived on the coast of Virginia in the beginning of July, while the British fleet was employed in conveying the forces from Sandy Hook to New York. It consisted of one ship of 90 guns, one of 80, six of 74, and four of 64, besides several large frigates; and, exclusive of its complement of sailors, had 6000 marines and soldiers on board. To oppose this the British had only six ships of 64 guns, three of 50, and two of 40, with some frigates and sloops. Notwithstanding this inferiority, however, the British admiral posted himself so advantageously, and showed such superior skill, that d'Estaing did not think proper to attack him. He therefore remained at anchor four miles off Sandy Hook till the 22d of July, without effecting any thing more than the capture of some vessels, which, through ignorance of his arrival, fell into his hands.

315
Attempts
Rhode
Island
without
success.

The next attempt of the French admiral was, in conjunction with the Americans, on Rhode Island. It was proposed that d'Estaing, with the 6000 troops he had with him, should make a descent on the southern part of the island, while a body of the Americans should take possession of the north; at the same time the French squadron was to enter the harbour of Newport, and take and destroy all the British shipping. On the 8th of August the French admiral entered the harbour as was proposed, but found himself unable to do any material damage. Lord Howe, however, instantly set sail for Rhode Island; and d'Estaing, confiding in his superiority, immediately came out of the harbour to attack him. A violent storm parted the two fleets, and did so much damage that they were rendered totally unfit for action. The French, however, suffered most; and several of their ships being afterwards attacked singly by the British, very narrowly escaped being taken. On the 20th of August he returned to Newport in a very shattered condition; and, not thinking himself safe there, sailed two days after for Boston. General Sullivan had landed in the mean time on the northern part of Rhode Island with 10,000 men. On the 17th of August they began their operations by erecting batteries, and making their approaches to the British lines. But General Pigot, who commanded in Newport, had taken such effectual care to secure himself on the land-side, that without the assistance of a marine force it was altogether impossible to attack him with any probability of success. The conduct of d'Estaing, therefore, who had abandoned them when master of the harbour, gave the greatest disgust to the people of New England, and Sullivan began to think of a retreat. On perceiving his intentions, the garrison sallied out upon him with so much vigour, that it was not without difficulty that he effected his retreat. He had not been long gone when Sir Henry Clinton arrived with a body of 4000 men; which, had it arrived sooner, would have enabled the British commander to have gained a decisive advantage over him, as well as to have destroyed the town of Providence, which, by its vicinity to Rhode Island, and the enterprises which were continually projected and carried on in that place, kept the inhabitants of Rhode Island in continual alarms.

The first British expedition was to Buzzard's Bay, on the coast of New England and neighbourhood of

Rhode Island. Here they destroyed a great number of privateers and merchantmen, magazines, with store-houses, &c.; whence proceeding to a fertile and populous island called Martha's Vineyard, they carried off 10,000 sheep and 300 black cattle. Another expedition took place up the North River, under Lord Cornwallis and General Knyphausen; the principal event of which was the destruction of a regiment of American cavalry known by the name of Washington's Light Horse. A third expedition was directed to Little Egg Harbour in New Jersey, a place noted for privateers, the destruction of which was its principal intention. It was conducted by Captains Ferguson and Collins, and ended in the destruction of the enemy's vessels, as well as of the place itself. At the same time part of another body of American troops, called Pulaski's Legion, was surprised, and a great number of them put to the sword.

America.
316
The coasts
of America
invaded by
the British
fleet.

The Americans had in the beginning of the year projected the conquest of West Florida; and one Captain Willing, with a party of resolute men, had made a successful incursion into the country. This awakened the attention of the British to the southern colonies, and an expedition against them was resolved on. Georgia was the place of destination; and the more effectually to ensure success, Colonel Campbell, with a sufficient force, under convoy of some ships of war, commanded by Commodore Hyde Parker, embarked at New York, while General Prevost, who commanded in East Florida, was directed to set out with all the force he could spare. The armament from New York arrived off the coast of Georgia in the month of December; and though the enemy were very strongly posted in an advantageous situation on the shore, the British troops made good their landing, and advanced towards Savannah the capital of the province. That very day they defeated the force of the provincials which opposed them; and took possession of the town with such celerity, that the Americans had not time to execute a resolution they had taken of setting it on fire. In ten days the whole province of Georgia was reduced, Sunbury alone excepted; and this was also brought under subjection by General Prevost in his march northward. Every proper method was taken to secure the tranquillity of the country; and rewards were offered for apprehending committee and assembly men, or such as they judged most inimical to the British interests. On the arrival of General Prevost, the command of the troops naturally devolved on him as the senior officer; and the conquest of Carolina was next projected.

318
Take pos-
session of
Georgia.

In this attempt there was no small probability of success. The country contained a great number of friends to government, who now eagerly embraced the opportunity of declaring themselves; many of the inhabitants of Georgia had joined the royal standard; and there was not in the province any considerable body of provincial forces capable of opposing the efforts of regular and well-disciplined troops. On the first news of General Prevost's approach, the loyalists assembled in a body, imagining themselves able to stand their ground until their allies should arrive; but in this they were disappointed. The Americans attacked and defeated them with the loss of half their number. The remainder retreated into Georgia; and after undergoing

319
Carolina
invaded.

America dergoing many difficulties, at last effected a junction with the British forces.

20
Americans
defeated.

In the mean time, General Lincoln, with a considerable body of American troops, had encamped within 20 miles of the town of Savannah; and another strong party had posted themselves at a place called *Briar's Creek*, farther up the river of the same name. Thus the extent of the British government was likely to be circumscribed within very narrow bounds. General Prevost, therefore, determined to dislodge the party at Briar's Creek: and the latter, trusting to their strong situation, and being remiss in their guard, suffered themselves to be surprised on the 30th of March 1779; when they were utterly routed with the loss of 400 killed and taken, besides a great number drowned in the river or the swamps. The whole artillery, stores, baggage, and almost all the arms, of this unfortunate party were taken, so that they could no more make any stand; and thus the province of Georgia was once more freed from the enemy, and a communication opened with those places in Carolina where the royalists chiefly resided.

The victory at Briar's Creek proved of considerable service to the British cause. Great numbers of the loyalists joined his army, and considerably increased its force. Hence he was enabled to stretch his posts farther up the river, and to guard all the principal passes: so that General Lincoln was reduced to a state of inaction; and at last moved off towards Augusta, in order to protect the provincial assembly, which was obliged to sit in that place, the capital being now in the hands of the British.

Lincoln had no sooner quitted his post, than it was judged a proper time by the British general to put in execution the grand scheme which had been meditated against Carolina. Many difficulties indeed lay in his way. The river Savannah was so swelled by the excessive rains of the season, that it seemed impassable; the opposite shore, for a great way, was so full of swamps and marshes, that no army could march over it without the greatest difficulty; and, to render the passage still more difficult, General Moultrie was left with a considerable body of troops in order to oppose the enemy's attempts. But in spite of every opposition, the constancy and perseverance of the British forces at last prevailed. General Moultrie was defeated, and obliged to retire towards Charlestown; and the victorious army, after having waded through the marshes for some time, at last arrived in an open country, through which they pursued their march with great rapidity towards the capital; while General Lincoln remained in a state of security at Augusta, vainly imagining that the obstacles he had left in the way could not be surmounted.

321
The British troops
advance to
Charlestown.

322
General Lincoln
advances
to its relief.

Certain intelligence of the danger to which Charlestown was exposed, at last aroused the American general from his lethargy. A chosen body of infantry, mounted on horseback for the greater expedition, was dispatched before him; while Lincoln himself followed with all the forces he could collect. General Moultrie too, with the troops he had brought from the Savannah, and some others he had collected since his retreat from thence, had taken possession of all the avenues leading to Charlestown, and prepared for a vigorous defence. But all opposition proved ineffectual. The Americans were defeated in every encounter;

and retreating continually, allowed the British army to come within cannon shot of Charlestown on the 12th of May.

The town was now summoned to surrender, and the inhabitants would gladly have agreed to observe a neutrality during the rest of the war, and would have engaged also for the rest of the province. But these terms not being accepted, they made preparations for a vigorous defence. It was not, however, in the power of the British commander at this time to make an attack with any prospect of success. His artillery was not of sufficient weight; there were no ships to support his attack by land; and General Lincoln advancing rapidly with a superior army, threatened to inclose him between his own force and the town; so that should he fail in his first attempt, certain destruction would be the consequence. For these reasons he withdrew his forces from before the town, and took possession of two islands called *St James's* and *St John's*, lying to the southward; where, having waited some time, his force was augmented by the arrival of two frigates. With these he determined to make himself master of Port Royal, another island possessed of an excellent harbour and many other natural advantages, from its situation also commanding all the sea-coast from Charlestown to Savannah River. The American general, however, did not allow this to be accomplished without opposition. Perceiving that his opponent had occupied an advantageous post on *St John's Island* preparatory to his enterprise against Port Royal, he attempted, on the 20th of June, to dislodge him from it; but after an obstinate attack, the provincials were, as usual, obliged to retire with considerable loss. On this occasion the success of the British arms was in a great measure owing to an armed float; which galled the right flank of the enemy so effectually, that they could direct their efforts only against the strongest part of the lines, which proved impregnable to their attacks. This disappointment was instantly followed by the loss of Port Royal, which General Prevost took possession of, and put his troops into proper stations, waiting for the arrival of such reinforcements as were necessary for the intended attack on Charlestown.

323
The attempt
on it abandoned.

324
The Americans
defeated.

In the mean time Count d'Estaing, who, as we have already observed, had put into Bolton harbour to refit, had used his utmost efforts to ingratiate himself with the inhabitants of that city. Zealous also in the cause of his master, he had published a proclamation to be dispersed through Canada, inviting the people to return to their original friendship with France, and declaring that all who renounced their allegiance to Great Britain should certainly find a protector in the king of France. All his endeavours, however, proved insufficient at this time to produce any revolution, or even to form a party of any consequence among the Canadians.

325
D'Estaing's
proclamation.

As soon as the French admiral had refitted his fleet, he took the opportunity, while that of Admiral Byron had been shattered by a storm, of sailing to the West Indies. During his operations there, the Americans having represented his conduct as totally unserviceable to them, he received orders from Europe to assist the colonies with all possible speed.

326

In compliance with these orders, he directed his course towards Georgia, with a design to recover that

D'Estaing
sails to the
West Indies.

America. province out of the hands of the enemy, and to put it as well as South Carolina, in such a posture of defence as would effectually secure them from any future attack. This seemed to be an easy matter, from the little force with which he knew he should be opposed; and the next object in contemplation was no less than the destruction of the British fleet and army at New York, and their total expulsion from the continent of America. Full of these hopes, the French commander arrived off the coast of Georgia with a fleet of 22 sail of the line and 10 large frigates. His arrival was so little expected, that several vessels laden with provisions and military stores fell into his hands; the Experiment also, a vessel of 50 guns, commanded by Sir James Wallace, was taken after a stout resistance. On the continent, the British troops were divided. General Prevost, with an inconsiderable part, remained at Savannah; but the main force was under Colonel Maitland at Port Royal. On the first appearance of the French fleet, an express was dispatched to Colonel Maitland; but it was intercepted by the enemy; so that before he could set out in order to join the commander in chief, the Americans had secured most of the passes by land, while the French fleet effectually blocked up the passage by sea. But, by taking advantage of creeks and inlets, and, marching over land, he arrived just in time to relieve Savannah.

328. **Aburd** D'Estaing, after making a gasconade of what had happened at St Vincents and Grenada, had allowed General Prevost 24 hours to deliberate whether he should capitulate or not. This time the general employed in making the best preparations he could for a defence; and during this time it was that Colonel Maitland arrived. D'Estaing's summons was now rejected; and as on this occasion the superiority of the enemy was by no means so much out of proportion as it had been at Grenada, there was every probability of success on the part of the British. The garrison now consisted of 3000 men, all of approved valour and experience, while the united force of the French and Americans did not amount to 10,000. The event was answerable to the expectations of the British general. Having the advantage of a strong fortification and excellent engineers, the fire of the allies made so little impression, that d'Estaing resolved to bombard the town, and a battery of nine mortars was erected for the purpose. This produced a request from General Prevost, that the women and children might be allowed to retire to a place of safety. But the allied commanders had the inhumanity to refuse compliance; and they resolved to give a general assault. This was accordingly attempted on the 9th of October: but the assailants were every where repulsed with such slaughter, that 1200 were killed and wounded; among the former were Count Polaski, and among the latter was d'Estaing himself.

329. **Cruelty of the French and American generals.** This disaster entirely overthrew the sanguine hopes of the Americans and French; mutual reproaches and animosities took place in the most violent degree; and after waiting eight days longer, both parties prepared for a retreat; the French to their shipping, and the Americans into Carolina.

330. **They are utterly defeated.** While the allies were thus unsuccessfully employed in the southern colonies, their antagonists were no less assiduous in distressing them in the north-

ern parts. Sir George Collier was sent with a fleet, America carrying on board General Matthews, with a body of land forces, into the province of Virginia. Their first attempt was on the town of Portsmouth; where, though the enemy had destroyed some ships of great value, the British troops arrived in time to save a great number of others. On this occasion about 120 vessels of different sizes were burnt, and 20 carried off; and an immense quantity of provisions designed for the use of General Washington's army was either destroyed or carried off, together with a great variety of naval and military stores. The fleet and army returned with little or no loss to New York.

331. **Successful expeditions against the northern American provinces.** The success with which this expedition was attended, soon gave encouragement to attempt another. The Americans had for some time been employed in the erection of two strong forts on the river; the one at Verplanks Neck on the east, and the other at Stoney Point on the west side. These when completed would have been of the utmost service to the Americans, as commanding the principal pass, called the *King's Ferry*, between the northern and southern colonies. At present, however, they were not in a condition to make any effectual defence; and it was therefore determined to attack them before the works should be completed. The force employed on this occasion was divided into two bodies; one of which directed its course against Verplanks, and the other against Stoney Point. The former was commanded by General Vaughan, the latter by General Pattison, while the shipping was under the direction of Sir George Collier. General Vaughan met with no resistance, the enemy abandoning their works, and setting fire to every thing combustible that they could not carry off. At Stoney Point, however, a vigorous defence was made, though the garrison was at last obliged to capitulate upon honourable conditions. To secure the possession of this last, which was the more important of the two, General Clinton removed from his former situation, and encamped in such a manner that Washington could not give any assistance. The Americans, however, revenged themselves by distressing, with their numerous privateers, the trade to New York.

This occasioned a third expedition to Connecticut, where these privateers were chiefly built and harboured. The command was given to Governor Tryon and to General Garth, an officer of known valour and experience. Under convoy of a considerable number of armed vessels they landed at Newhaven, where they demolished the batteries that had been erected to oppose them, and destroyed the shipping and naval stores; but they spared the town itself, as the inhabitants had abstained from firing out of their houses upon the troops. From Newhaven they marched to Fairfield, where they proceeded as before, reducing the town also to ashes. Norwalk was next attacked, which in like manner was reduced to ashes; as was also Greenfield, a small seaport in the neighbourhood.

These successes proved very alarming as well as detrimental to the Americans; so that General Washington determined at all events to drive the enemy from Stoney Point. For this purpose he sent Gen. Wayne with a detachment of chosen men, directing them to attempt the recovery of it by surprise. On this occasion the Americans showed a spirit and resolution exceeding

America. ceeding any thing they had performed during the course of the war. Though after the capture of it by the British the fortifications of this place had been completed, and were very strong, they attacked the enemy with bayonets, after passing through a heavy fire of musquetry and grape shot; and in spite of all opposition, obliged the surviving part of the garrison, amounting to 500 men, to surrender themselves prisoners of war.

Though the Americans did not at present attempt to retain possession of Stoney Point, the success they had met with in the enterprise emboldened them to make a similar attempt on Paulus Hook, a fortified post on the Jersey side opposite to New York; but in this they were not attended with equal success, being obliged to retire with precipitation after they had made themselves masters of one or two posts.

³³² **Unsuccessful expedition of the Americans against Penobscot.** Another expedition of greater importance was now projected on the part of the Americans. This was against a post on the river Penobscot, on the borders of Nova Scotia, of which the British had lately taken possession, and where they had begun to erect a fort which threatened to be a very great inconvenience to the colonists. The armament destined against it was so soon got in readiness, that Colonel MacLane, the commanding officer at Penobscot, found himself obliged to drop the execution of part of his scheme; and instead of a regular fort, to content himself with putting the works already constructed in as good a posture of defence as possible. The Americans could not effect a landing without a great deal of difficulty, and bringing the guns of their largest vessels to bear upon the shore. As soon as this was done, however, they erected several batteries, and kept up a brisk fire for the space of a fortnight; after which they proposed to give a general assault: but before this could be effected, they perceived Sir George Collier with a British fleet sailing up the river to attack them. On this they instantly embarked their artillery and military stores, sailing up the river as far as possible in order to avoid him. They were so closely pursued, however, that not a single vessel could escape; so that the whole fleet, consisting of 19 armed vessels and 24 transports, was destroyed; most of them indeed being blown up by themselves. The soldiers and sailors were obliged to wander through immense deserts, where they suffered much for want of provisions; and to add to their calamities, a quarrel broke out between the soldiers and seamen concerning the cause of their disaster, which ended in a violent fray, wherein a great number were killed.

³³³ **Spain joins the confederacy against Britain.** Thus the arms of America and France being almost every where unsuccessful, the independency of the former seemed yet to be in danger notwithstanding the assistance of so powerful an ally, when further encouragement was given by the accession of Spain to the confederacy against Britain in the month of June 1779. The first effect of this appeared in an invasion of West Florida by the Spaniards in September 1779. As the country was in no state of defence, the enemy easily made themselves masters of the whole almost without opposition. Their next enterprise were against the Bay of Honduras, where the British log-wood cutters were settled. These finding themselves too weak to resist, applied to the governor of Jamaica for relief; who sent them a supply of men, ammunition, and mi-

litary stores, under Captain Dalrymple. Before the arrival of this detachment, the principal settlement in those parts, called *St George's Key*, had been taken by the Spaniards and retaken by the British. In his way Captain Dalrymple fell in with a squadron from Admiral Parker in search of some register ships richly laden; but which retreating into the harbour of Omoa, were too strongly protected by the fort to be attacked with safety. A project was then formed, in conjunction with the people of Honduras, to reduce this fort. The design was to surprise it; but the Spaniards having discovered them, they were obliged to fight. Victory quickly declared for the British; but the fortifications were so strong, that the artillery they had brought along with them were found too light to make any impression. It was then determined to try the success of an escalade; and this was executed with so much spirit, that the Spaniards stood astonished without making any resistance, and, in spite of all the efforts of the officers, threw down their arms and surrendered. The spoil was immense, being valued at three millions of dollars. The Spaniards chiefly lamented the loss of 250 quintals of quicksilver; a commodity indispensably necessary in the working of their gold and silver mines, so that they offered to ransom it at any price; but this was refused, as well as the ransom of the fort, though the governor offered 300,000 dollars for it. A small garrison was left for the defence of the place: but it was quickly attacked by a superior force, and obliged to evacuate it, though not without destroying every thing that could be of use to the enemy; spiking the guns, and even locking the gates of the fort and carrying off the keys. All this was done in sight of the besiegers; after which the garrison embarked without the loss of a man.

³³⁴ **Fort Omoa taken by the British.** As no operations of any consequence took place this year in the province of New York, the congress made use of the opportunity to dispatch General Sullivan with a considerable force, in order to take vengeance on the Indians for their ravages and depredations: and the object of the expedition was, not merely the reduction of them, but if possible their utter extirpation. Of this the Indians were apprised; and collecting all their strength, resolved to come to a decisive engagement. Accordingly they took a strong post in the most woody and mountainous part of the country; erecting a breast-work in their front of large logs of wood extending half a mile in length, while their right flank was covered by a river, and the left by a hill of difficult access. This advantageous position they had taken by the advice of the refugees who were among them, and of whom 200 or 300 were present in the battle.

³³⁵ **But they are obliged to evacuate it.** Thus posted, the Indians waited the approach of the American army: but the latter having brought some artillery along with them, played it against the breast-work of the enemy with such success, that in two hours it was almost destroyed; and at the same time a party having reached the top of the hill, they became apprehensive of being surrounded, on which they instantly fled with precipitation, leaving a great number of killed and wounded behind them. The Americans after this battle met with no further resistance of any consequence. They were suffered to proceed without interruption, and to execute in the most ample

³³⁶ **Americans take vengeance on the Indians.**

America. ple manner the vengeance they had projected. On entering the country of the Indians, it appeared that they had been acquainted with agriculture and the arts of peace far beyond what had been supposed. From General Sullivan's account it was learned, that the Indian houses were large, convenient, and even elegant; their grounds were excellently cultivated, and their gardens abounded in fruit-trees and vegetables of all kinds fit for food. The whole of this fine country was now by the American general converted into a desert. Forty towns and settlements, besides scattered habitations, were demolished; the fields of corn, the orchards, the plantations, were utterly laid waste; all the fruit-trees were cut down; and so great had been the industry of the Indians, that in one orchard 1500 of these were destroyed. The quantity of corn wasted on this occasion was supposed to amount to 160,000 bushels. In short, such was the desolation, that on the American army's leaving the country, not a house, not a field of corn, nor a fruit-tree, was left upon the ground, nor was an Indian to be seen throughout the whole track.

337
Expedition of Sir
Henry Clinton
against
Charlestown.

We must now take a view of the transactions in the southern colonies; to which the war was, in the year 1780, so effectually transferred, that the operations there became at last decisive. The success of General Prevost in advancing to the very capital of South Carolina has been already related, together with the obstacles which prevented him from becoming master of it at that time. Towards the end of the year 1779, however, Sir Henry Clinton set sail from New York with a considerable body of troops, intended for the attack of Charlestown, South Carolina, in a fleet of ships of war and transports under the command of Vice-admiral Arbuthnot. They had a very tedious voyage; the weather was uncommonly bad; several of the transports were lost, as were also the greater part of the horses which they carried with them, intended for cavalry or other public uses; and an ordnance-ship likewise foundered at sea. Having arrived at Savannah, where they endeavoured to repair the damages sustained on their voyage, they proceeded from thence on the 10th of February 1780 to North Edisto, the place of debarkation which had been previously appointed. They had a favourable and speedy passage thither: and though it required time to have the bar explored and the channel marked, the transports all entered the harbour the next day; and the army took possession of John's Island without opposition. Preparations were then made for passing the squadron over Charlestown bar, where the high-water spring-tides were only 19 feet deep: but no opportunity offered of going into the harbour till the 20th of March, when it was effected without any accident, though the American galleys continually attempted to prevent the English boats from founding the channel. The British troops had previously removed from John's to James's Island; and on the 29th of the same month they effected their landing on Charlestown Neck. On the 1st of April they broke ground within 800 yards of the American works; and by the 8th the besiegers guns were mounted in battery.

As soon as the army began to erect their batteries against the town, Admiral Arbuthnot embraced the first favourable opportunity of passing Sullivan's Island,

upon which there was a strong fort of batteries, the chief defence of the harbour. He weighed on the 9th, with the Roebuck, Richmond, and Romulus, Blonde, Virginia, Raleigh, and Sandwich armed ship, the Renown bringing up the rear; and, passing through a severe fire, anchored in about two hours under James's Island, with the loss of 27 seamen killed and wounded. The Richmond's fore-top-mast was shot away, and the ships in general sustained damage in their masts and rigging, though not materially in their hulls. But the Acetus transport, having on board some naval stores, grounded within gun-shot of Sullivan's Island, and received so much damage that she was obliged to be abandoned and burnt.

On the 10th Sir Henry Clinton and Admiral Arbuthnot summoned the town to surrender to his Majesty's arms: but Major-general Lincoln, who commanded in Charlestown, returned them an answer, declaring it to be his intention to defend the place. The batteries were now opened against the town; and from their effect the fire of the American advanced works considerably abated. It appears that the number of troops under the command of Lincoln were by far too few for defending works of such extent as those of Charlestown; and that many of these were men little accustomed to military service, and very ill provided with clothes and other necessaries. Lincoln had been for some time expecting reinforcements and supplies from Virginia and other places: but they came in very slowly. Earl Cornwallis, and Lieutenant-colonel Tarleton under him, were also extremely active in intercepting such reinforcements and supplies as were sent to the American general. They totally defeated a considerable body of cavalry and militia which was proceeding to the relief of the town; and also made themselves masters of some posts, which gave them in a great degree the command of the country, by which means great supplies of provisions fell into their hands.

Such was the state of things, and Fort Sullivan had also been taken by the king's troops, when on the 18th of May General Clinton again summoned the town to surrender; an offer being made, as had been done before, that if they surrendered, the lives and property of the inhabitants should be preserved to them. Articles of capitulation were then proposed by General Lincoln; but the terms were not agreed to by General Clinton. At length, however, the town being closely invested on all sides, and the preparations to storm it in every part being in great forwardness, and the ships ready to move to the assault, General Lincoln, who had been applied to for that purpose by the inhabitants, surrendered it on such articles of capitulation as General Clinton had before agreed to. This was on the 4th of May, which was one month and two days after the town had been first summoned to surrender.

A large quantity of ordnance, arms, and ammunition, was found in Charlestown; and, according to Sir Henry Clinton's account, the number of prisoners taken in Charlestown amounted to 5618 men, exclusively of near a thousand sailors in arms; but according to General Lincoln's account transmitted to the congress, the whole number of continental troops taken prisoners amounted to no more than 2487. The remainder, therefore, included in General Clinton's account,

338
The town
defended
by Lincoln.

339
Several reinforcements
intended for
his relief
intercepted.

330
The place
surrendered.

America. account, must have consisted of militia and inhabitants of the town. Several American frigates were also taken or destroyed in the harbour of Charlestown.

The loss of Charlestown evidently excited a considerable alarm in America: and their popular writers, particularly the author of the celebrated performance intitled *Common Sense*, in some other pieces made use of it as a powerful argument to lead them to more vigorous exertions against Great Britain, that they might the more effectually and certainly secure their independence.

³⁴¹ **Apprehensions at New York.** While Sir Henry Clinton was employed in his voyage to Charlestown, and in the siege of that place, the garrison at New York seem not to have been wholly free from apprehensions for their own safety. An intense frost, accompanied with great falls of snow, began about the middle of December 1779, and shut up the navigation of the port of New York from the sea, within a few days after the departure of Admiral Arbuthnot and General Clinton. The severity of the weather increased to so great a degree, that towards the middle of January all communications with New York by water were entirely cut off, and as many new ones opened by the ice. The inhabitants could scarcely be said to be in an insular state. Horses with heavy carriages could go over the ice into the Jerseys from one island to another. The passage in the North River, even in the widest part from New York to Paulus Hook, which was 2000 yards, was about the 19th of January practicable for the heaviest cannon: an event which had been unknown in the memory of man. Provisions were soon after transported upon sledges, and a detachment of cavalry marched upon the ice from New York to Staten Island, which was a distance of 11 miles.

³⁴² **Forwardness of the inhabitants to be inrolled for its defence.** The city of New York being thus circumstanced, was considered as much exposed to the attacks from the continental troops: and it was strongly reported that General Washington was meditating a great stroke upon New York with his whole force, by different attacks. Some time before this, Major-general Pattison, commandant at New York, having received an address from many of the inhabitants, offering to put themselves in military array, he thought the present a favourable opportunity of trying the sincerity of their professions. Accordingly he issued a proclamation, calling upon all the male inhabitants from 16 to 60 to take up arms. The requisition was so readily complied with, that in a few days 40 companies from the six wards of the city were inrolled, officered, and under arms, to the number of 2600, many substantial citizens serving in the ranks of each company. Other volunteer companies were formed; and the city was put into a very strong posture of defence.

³⁴³ **The provincials attack Staten Island;** No attack, however, was made upon New York, whatever design might originally have been meditated; but an attempt was made upon Staten Island, where there were about 1800 men, under the command of Brigadier-general Sterling, who were well intrenched. General Washington, whose army was huddled at Morris-Town, sent a detachment of 2700 men, with six pieces of cannon, two mortars, and some horses, commanded by Lord Sterling, who arrived at Staten Island early in the morning of the 15th of January. The advanced posts of the British

troops retired upon the approach of the Americans, who formed the line, and made some movements in the course of the day; but they withdrew in the night, after having burnt one house, pillaged some others, and carried off with them about 200 head of cattle. Immediately on the arrival of the Americans on Staten Island, Lieutenant-general Knyphausen had embarked 600 men to attempt a passage, and to support General Sterling: but the floating ice compelled them to return. It is, however, imagined, that the appearance of these transports, with the British troops on board, which the Americans could see towards the close of the day, induced the latter to make so precipitate a retreat.

³⁴⁴ **America.** After Charlestown had surrendered to the king's troops, General Clinton issued two proclamations, and also circulated a hand-bill amongst the inhabitants of South Carolina, in order to induce them to return to their allegiance, and to be ready to join the king's troops. It was said, that the helping hand of every man was wanted to re-establish peace and good government: and that as the commander in chief wished not to draw the king's friends into danger, while any doubt could remain of their success; so now that this was certain, he trusted that one and all would heartily join, and by a general concurrence give effect to such necessary measures for that purpose as from time to time might be pointed out. Those who had families were to form a militia to remain at home, and occasionally to assemble in their own districts, when required, under officers of their own choosing, for the maintenance of peace and good order. Those who had no families, and who could conveniently be spared for a time, it was presumed, would cheerfully assist his Majesty's troops in driving their oppressors, acting under the authority of congress, and all the miseries of war, far from that colony. For this purpose it was said to be necessary that the young men should be ready to assemble when required, and to serve with the king's troops for any six months of the ensuing twelve that might be found requisite, under proper regulations. They might choose officers to each company to command them; and were to be allowed, when on service, pay, ammunition, and provisions, in the same manner as the king's troops. When they joined the army, each man was to be furnished with a certificate, declaring that he was only engaged to serve as a militia-man for the time specified; that he was not to be marched beyond North Carolina and Georgia; and that, when the time was out, he was freed from all claims whatever of military service, excepting the common and usual militia-duty where he lived. He would then, it was said, have paid his debt to his country, and be intitled to enjoy undisturbed that peace, liberty, and property, at home, which he had contributed to secure. The proclamations and publications of General Clinton appear to have produced some effect in South Carolina; though they probably operated chiefly upon those who were before not much inclined to the cause of American independence. Two hundred and ten of the inhabitants of Charlestown signed an address to General Clinton and Admiral Arbuthnot, soliciting to be readmitted to the character and condition of British subjects, the inhabitants of that city having been hitherto considered as prisoners on parole; declaring their

³⁴⁵ **Proclamations by General Clinton.**

America. their disapprobation of the doctrine of American independence; and expressing their regret, that after the repeal of those statutes which gave rise to the troubles in America, the overtures made by his majesty's commissioners had not been regarded by the congress. Sir Henry Clinton, in one of the proclamations issued at this time, declared, that if any persons should thenceforward appear in arms in order to prevent the establishment of his majesty's government in that country, or should under any pretence or authority whatsoever attempt to compel any other person or persons to do so, or who should hinder or intimidate the king's faithful and loyal subjects from joining his forces, or otherwise performing those duties their allegiance required, such persons should be treated with the utmost severity, and their estates be immediately seized in order to be confiscated.

Mean time the ravages of war did not prevent the Americans from paying some attention to the arts of peace. On the 4th of May an act passed by the council and house of representatives of Massachusetts Bay for incorporating and establishing a society for the cultivation and promotion of the arts and sciences. See ACADEMY, p. 43. col. 2.

346
Proceed-
ings of
congress.

Some doubts having arisen in the congress, towards the close of the preceding year, about the propriety of their assembling in the city of Philadelphia, it was now resolved that they should continue to meet there; and a committee of three members was appointed, to report a proper place where buildings might be provided for the reception of the congress, together with an estimate of the expence of providing such buildings and the necessary offices for the several boards. It was also resolved by the congress, that a monument should be erected to the memory of their late General Richard Montgomery, who fell at Quebec, in testimony of his signal and important services to the United States of America, with an inscription expressive of his amiable character and heroic achievements; and that the continental treasurers should be directed to advance a sum not exceeding L. 300 to Dr Franklin to defray the expence; that gentleman being desired to cause the monument to be executed at Paris, or in some other part of France. It was likewise resolved by the congress, that a court should be established for the trial of all appeals from the court of admiralty of the United States of America, in cases of capture; to consist of three judges, appointed and commissioned by congress, and who were to take an oath of office; and that the trials in this court should be determined by the usage of nations.

347
Difficulties
arising
from the
depreciation
of
their pa-
per cur-
rency.

The difficulties of the congress and of the people of America had been greatly increased by the depreciation of their paper currency. At the time when the colonies engaged in a war with Great Britain, they had no regular civil governments established among them of sufficient energy to enforce the collection of taxes, or to provide funds for the redemption of such bills of credit as their necessities obliged them to issue. In consequence of this state of things, their bills increased in quantity far beyond the sum necessary for the purpose of a circulating medium: and as they wanted at the same time specific funds to rest on for their redemption, they saw their paper-currency daily sink in

N^o 16.

value. The depreciation continued, by a kind of gradual progression, from the year 1777 to 1780: so that, at the latter period, the continental dollars were passed, by common consent, in most parts of America, at the rate of at least $\frac{1}{2}$ ths below their nominal value. The impossibility of keeping up the credit of the currency to any fixed standard, occasioned great and almost insurmountable embarrassments in ascertaining the value of property, or carrying on trade with any sufficient certainty. Those who sold, and those who bought, were left without a rule whereon to form a judgment of their profit or their loss; and every species of commerce or exchange, whether foreign or domestic, was exposed to numberless and increasing difficulties. The consequences of the depreciation of the paper-currency were also felt with peculiar severity by such of the Americans as were engaged in their military services, and greatly augmented their other hardships. The requisitions made by the congress to the several colonies for supplies, were also far from being always regularly complied with: and their troops were not unfrequently in want of the most common necessities; which naturally occasioned complaints and discontent among them. Some of these difficulties, resulting from their circumstances and situation, perhaps no wisdom could have prevented: but they seem to have arisen in part from the congress not being sufficiently acquainted with the principles of finance, and from a defect of system in the departments of their government. The cause of the Americans appears also to have suffered somewhat by their depending too much on temporary enlistments. But the congress endeavoured, towards the close of the year 1780, to put their army upon a more permanent footing, and to give all the satisfaction to their officers and soldiers which their circumstances would permit. They appointed a committee for arranging their finances, and made some new regulations respecting their war-office and treasury-board, and other public departments.

Notwithstanding the disadvantages under which they laboured, the Americans seemed to entertain no doubts but that they should be able to maintain their independence. The 4th of July was celebrated this year at Philadelphia with some pomp, as the anniversary of American independence. A commencement for conferring degrees in the arts was held the same day, in the hall of the university there; at which the president and members of the congress attended, and other persons in public offices. The Chevalier De la Lucerne, minister plenipotentiary from the French king to the United States, was also present on the occasion. A charge was publicly addressed by the provost of the university to the students; in which he said, that he could not but congratulate them "on that auspicious day, which, amidst the confusions and desolations of war, beheld learning beginning to revive; and animated them with the pleasing prospect of seeing the sacred lamp of science burning with a still brighter flame, and scattering its invigorating rays over the unexplored deserts of that extensive continent; until the whole world should be involved in the united blaze of knowledge, liberty, and religion. When he stretched his views forward (he said), and surveyed the rising glories of America, the enriching consequences of their determined struggle

148

Anniver-
sary of A-
merican
independ-
ence ce-
lebrated at
Philadel-
phia.

America. gle for liberty, the extensive fields of intellectual improvement and useful invention, in science and arts, in agriculture and commerce, in religion and government, through which the unfettered mind would range, with increasing delight, in quest of the undiscovered treasure which yet lay concealed in the animal, vegetable, and mineral kingdoms of that new world: or in the other fertile sources of knowledge with which it abounded. His heart swelled with the pleasing prospect, that the sons of that institution would distinguish themselves, in the different walks of life, by their literary contributions to the embellishment and increase of human happiness.

349
A large
body of
French
troops
landed
at Rhode
Island.

On the 10th of July, M. Ternay, with a fleet consisting of seven ships of the line, besides frigates, and a large body of French troops, commanded by the Count de Rochambeau, arrived at Rhode Island; and the following day 6000 men were landed there. A committee from the general assembly of Rhode Island was appointed to congratulate the French general upon his arrival: whereupon he returned an answer, in which he informed them, that the king his master had sent him to the assistance of his good and faithful allies the United States of America. At present, he said, he only brought over the vanguard of a much greater force destined for their aid; and the king had ordered him to assure them, that his whole power should be exerted for their support. He added, that the French troops were under the strictest discipline; and, acting under the orders of General Washington, would live with the Americans as their brethren.

A scheme was soon after formed, of making a combined attack with English ships and troops, under the command of Sir Henry Clinton and Admiral Arbuthnot, against the French fleet and troops at Rhode Island. Accordingly a considerable part of the troops at New York were embarked for that purpose. General Washington having received information of this, passed the North River, by a very rapid movement, and, with an army increased to 12,000 men, proceeded with celerity towards King's Bridge, in order to attack New York; but learning that the British general had changed his intentions, and disembarked his troops on the 31st of the month, General Washington recrossed the river, and returned to his former station. Sir Henry Clinton and the Admiral had agreed to relinquish their design of attacking the French and Americans at Rhode Island as impracticable for the present.

350
Unsuccessful
expedition
in the
Jerseys.
An unsuccessful attempt was also made about this time in the Jerseys by General Knyphausen, with 7000 British troops under his command, to surprise the advanced posts of General Washington's army. They proceeded very rapidly towards Springfield, meeting little opposition till they came to the bridge there, which was very gallantly defended by 170 of the continental troops, for 15 minutes, against the British army: but they were at length obliged to give up so unequal a contest, with the loss of 37 men. After securing this pass, the British troops marched into the place, and set fire to most of the houses. They also committed some other depredations in the Jerseys; but gained no laurels there, being obliged to return about the beginning of July without effecting any thing material.

But in South Carolina the royal arms were attended

VOL. I. Part II.

with more success. Earl Cornwallis, who commanded the British troops there, obtained a very signal victory over General Gates on the 16th of August. The action began at break of day, in a situation very advantageous for the British troops, but very unfavourable to the Americans. The latter were much more numerous; but the ground on which both armies stood was narrowed by swamps on the right and left, so that the Americans could not properly avail themselves of their superior numbers. There seems to have been some want of generalship in Gates, in suffering himself to be surprised in so disadvantageous a position: but this circumstance was partly the effect of accident; for both armies set out with a design of attacking each other precisely at the same time, at ten the preceding evening, and met together before day-light at the place where the action happened. The attack was made by the British troops with great vigour, and in a few minutes the action was general along the whole line. It was at this time a dead calm, with a little haziness in the air, which preventing the smoke from rising, occasioned so thick a darkness, that it was difficult to see the effect of a very heavy and well-supported fire on both sides. The British troops either kept up a constant fire, or made use of bayonets, as opportunities offered; and after an obstinate resistance during three quarters of an hour, threw the Americans into total confusion, and forced them to give way in all quarters. The continental troops appear to have behaved well, but the militia were soon broken, and left the former to oppose the whole force of the British troops. General Gates did all in his power to rally the militia, but without effect: the continentals retreated in some order; but the rout of the militia was so great, that the British cavalry are said to have continued the pursuit of them to the distance of 22 miles from the place where the action happened. The loss of the Americans was very considerable: about 1000 prisoners were taken, and more are said to have been killed and wounded, but the number is not very accurately ascertained. Seven pieces of brass cannon, a number of colours, and all the ammunition-waggons of the Americans, were also taken. Of the British troops, the killed and wounded amounted to 213. Among the prisoners taken was Major-general Baron de Kalb, a Prussian officer in the American service, who was mortally wounded, having exhibited great gallantry in the course of the action, and received 11 wounds. The British troops by which this great victory was achieved, did not much exceed 2000, while the American army is said to have amounted to 6000; of which, however, the greatest part was militia.

352
Lieutenant-colonel Tarleton, who had greatly distinguished himself in this action, was detached the following day, with some cavalry and light infantry, amounting to about 350 men, to attack a corps of Americans under General Sumpter. He executed this service with great activity and military address. He procured good information of Sumpter's movements; and by forced and concealed marches came up with and surprised him in the middle of the day on the 18th, near the Catawba fords. He totally destroyed or dispersed his detachment, which consisted of 700 men, killing 150 on the spot, and taking two pieces of brass cannon, 300 prisoners, and 44 waggons.

4 H

Not

351
Victory ob-
tained by
Lord Corn-
wallis over
Gen. Gates.

America. Not long after these events, means were found to detach Major-general Arnold, who had engaged so ardently in the cause of America, and who had exhibited so much bravery in the support of it, from the interests of the congress. Major André, adjutant-general to the British army, was a principal agent in this transaction: or, if the overture of joining the king's troops came first from Arnold, this gentleman was the person employed to concert the affair with him. More must have been originally comprehended in the scheme than the mere desertion of the American cause by Arnold: but whatever designs had been formed for promoting the views of the British government, they were frustrated by the apprehending of Major André. He was taken in disguise, after having assumed a false name, on the 23d of September, by three American soldiers; to whom he offered considerable rewards if they would have suffered him to escape, but without effect. Several papers written by Arnold were found upon him; and when Arnold had learned that Major André was seized, he found means to get on board a barge, and to escape to one of the king's ships. General Washington referred the case of Major André to the examination and decision of a board of general officers, consisting of Major-general Greene, Major-general Lord Sterling, Major-general the Marquis de la Fayette, Major-general the Baron de Stenben, two other Major-generals, and eight brigadier-generals. Major André was examined before them, and the particulars of his case inquired into; and they reported to the American commander in chief, that Mr André came on shore from the Vulture sloop of war in the night, on an interview with General Arnold, in a private and secret manner; that he changed his dress within the American lines; and, under a feigned name, and in a disguised habit, passed the American works at Stony and Verplank's Points, on the evening of the 22d of September; that he was taken on the morning of the 23d at Tarry-town, he being then on his way for New York; and that, when taken, he had in his possession several papers which contained intelligence for the enemy. They therefore determined, that he ought to be considered as a spy from the enemy; and that, agreeable to the law and usage of nations, he ought to suffer death. Sir Henry Clinton, Lieutenant-general Robertson, and the late American General Arnold, all wrote pressing letters to General Washington on the occasion, in order to prevent the decision of the board of general officers from being put in force: But their applications were ineffectual. Major André was hanged at Tappan, in the province of New York, on the 2d of October. He met his fate with great firmness; but appeared somewhat hurt that he was not allowed a more military death, for which he had solicited. He was a gentleman of very amiable qualities, had a taste for literature and the fine arts, and possessed many accomplishments. His death, therefore, was regretted even by his enemies; and the severity of the determination concerning him was much exclaimed against in Great Britain. It was, however, generally acknowledged by impartial persons, that there was nothing in the execution of this unfortunate gentleman but what was perfectly consonant to the rules of war. Arnold was made a brigadier-general in the king's service, and published an address to the inhabitants of

354
Unhappy
fate of
Major
André.

355
His amiable
character.

America, dated from New York October 7, in which he endeavoured to justify his desertion of their cause. He said, that when he first engaged in it, he conceived the rights of his country to be in danger, and that duty and honour called him to her defence. A redress of grievances was his only aim and object; and therefore he acquiesced unwillingly in the declaration of independence, because he thought it precipitate. But what now induced him to desert their cause was the disgust he had conceived at the French alliance, and at the refusal of congress to comply with the last terms offered by Great Britain, which he thought equal to all their expectations and to all their wishes.

The Americans, however, accounted for the conduct of Arnold in a different manner. They alleged that he had so involved himself in debts and difficulties by his extravagant manner of living in America, that he had rendered it very inconvenient for him to continue there: that after the evacuation of Philadelphia by the British troops, Arnold, being invested with the command in that city, had made the house of Mr Penn, which was the best in the city, his head-quarters. This he had furnished in an elegant and expensive manner, and lived in a style far beyond his income. It was manifest, they said, that he could at first have no great aversion to the French alliance, because when M. Gerard, minister plenipotentiary from the court of France, arrived at Philadelphia in July 1778, General Arnold early and earnestly solicited that minister, with his whole suite, to take apartments and bed and board at his house, until a proper house could be provided by the order of the congress. This offer M. Gerard accepted, and continued with him some weeks. The French minister resided upwards of 14 months in Philadelphia; during which time General Arnold kept up the most friendly and intimate acquaintance with him, and there was a continued interchange of dinners, balls, routes, and concerts: so that M. Gerard must have believed, that in General Arnold he had found and left one of the warmest friends the court of France had in America. He was also one of the first in congratulating the Chevalier la Luzerne, the second French minister. About this time complaints and accusations were exhibited against him by the government of Philadelphia for divers malpractices; among which charges were, the appropriation of goods and merchandise to his own use, which he had seized as British property in Philadelphia in July 1778. It was determined by a court-martial that his conduct was highly reprehensible; but he was indulgently treated, and was therefore only reprimanded by the commander in chief General Washington. It was in these circumstances, the Americans said, bankrupted in reputation and fortune, loaded with debts, and having a growing and expensive family, that General Arnold first turned his thoughts towards joining the Royal arms.

After the defeat of General Gates by Earl Cornwallis, that nobleman exerted himself to the utmost in extending the progress of the British arms, and with considerable effect. But one enterprize, which was conducted by Major Ferguson, proved unsuccessful. That officer had taken abundant pains to discipline some of the Tory militia, as they were termed; and with a party of these and some British troops, amounting

356
Motives
assigned by
Arnold for
his conduct.

357
Different
reasons al-
leged by
the Americans.

358
Actions in
South Carolina.

America. in the whole to about 1400 men, made incursions into the country. But on the 7th of October he was attacked by a superior body of Americans at a place called King's-mountain, and totally defeated. One hundred and fifty were killed in the action, and 810 made prisoners, of which 150 were wounded. Fifteen hundred stands of arms also fell into the hands of the Americans, whose loss was inconsiderable. But the following month Lieutenant-colonel Tarleton, who continued to exert his usual activity and bravery, with a party of 170, chiefly cavalry, attacked and defeated General Sumpter, who is said to have had 1000 men, at a place called Black Stocks. Sumpter was wounded, and about 120 of the Americans killed, wounded, or taken. Of the British troops about 50 were killed and wounded.

359
Capture of
Mr Lau-
rens.

On the 3d of September, the Mercury, a congress packet, was taken by the Vestal, captain Keppel, near Newfoundland. On board this packet was Mr Laurens, late president of the congress, who was bound on an embassy to Holland. He had thrown his papers overboard, but great part of them were recovered without having received much damage. He was brought to London, and examined before the privy-council; in consequence of which he was committed close prisoner to the Tower on the 6th of October, on a charge of high treason. His papers were delivered to the ministry, and contributed to facilitate a rupture with Holland, as among them was found the sketch of a treaty of amity and commerce between the republic of Holland and the United States of America.

360
Discon-
tents a-
mong the
American
troops.

At the beginning of the year 1781, an affair happened in America, from which expectations were formed by Sir Henry Clinton, that some considerable advantage might be derived to the Royal cause. The long continuance of the war, and the difficulties under which the congress laboured, had prevented their troops from being properly supplied with necessaries and conveniences. In consequence of this, on the first of January, the American troops that were huddled at Morris town, and who formed what was called the *Pennsylvania line*, turned out, being in number about 1300, and declared, that they would serve no longer, unless their grievances were redressed, as they had not received their pay, or been furnished with the necessary cloathing or provisions. It is said that they were somewhat inflamed with liquor, in consequence of rum having been distributed to them more liberally than usual, New-year's day being considered as a kind of festival. A riot ensued, in which an officer was killed, and four wounded; five or six of the insurgents were also wounded. They then collected the artillery, stores, provisions, and waggons, and marched out of the camp. They passed by the quarters of General Wayne, who sent a message to them, requesting them to desist, or the consequences would prove fatal. They refused, and proceeded on their march till the evening, when they took

361
Revolt of
the Pennsyl-
vania line.

post on an advantageous piece of ground, and elected officers from among themselves. On the second, they marched to Middlebrook, and on the third to Princetown, where they fixed their quarters. On that day a flag of truce was sent to them from the officers of the American camp, with a message, desiring to know what were their intentions. Some of them answered, that they had already served longer than the time for which

they were enlisted, and would serve no longer; and others, that they would not return, unless their grievances were redressed. But at the same time they repeatedly, and in the strongest terms, denied being influenced by the least disaffection to the American cause, or having any intentions of deserting to the enemy.

Intelligence of this transaction was soon conveyed to New York. A large body of British troops were immediately ordered to hold themselves in readiness to move on the shortest notice, it being hoped that the American revolvers might be induced to join the Royal army. Messengers were also sent to them from General Clinton, acquainting them that they should directly be taken under the protection of the British government; that they should have a free pardon for all former offences; and that the pay due to them from the congress should be faithfully paid them, without any expectation of military service, unless it should be voluntary, upon condition of their laying down their arms and returning to their allegiance. It was also recommended to them to move beyond the South river; and they were assured, that a body of British troops should be ready to protect them whenever they desired it. These propositions were rejected with disdain; and they even delivered up two of Sir Henry Clinton's messengers to the congress. Joseph Reed, Esq; president of the state of Pennsylvania, afterwards repaired to them at Princetown, and an accommodation took place; such of them as had served out their full terms were permitted to return to their own homes, and others again joined the American army, upon receiving satisfactory assurances that their grievances should be redressed.

362
Ineffectual
attempts
to induce
them to
join the
royal army

Lord Cornwallis now began to make very vigorous exertions, in order to penetrate into North Carolina. On the 11th of January his Lordship's army was in motion, and advancing towards that province; but was somewhat delayed by an attempt made by the Americans under General Morgan, to make themselves masters of the valuable district of Ninety-six. In order to prevent this, Lord Cornwallis detached Lieutenant-colonel Tarleton, with 300 cavalry, 300 light infantry, the 7th regiment, the first battalion of the 71st regiment, and two three-pounders, to oppose the progress of Morgan, not doubting but that he would be able to perform this service effectually. The British troops came up with the Americans under General Morgan on the 17th of January. The Americans were drawn up in an open wood, and having been lately joined by some militia, were more numerous than the British troops under Lieutenant-colonel Tarleton; but the latter were so much better disciplined, that they had the utmost confidence of obtaining a speedy victory. The attack was begun by the first line of infantry, consisting of the 7th regiment, and a corps of light infantry with a troop of cavalry placed on each flank. The first battalion of the 71st and the remainder of the cavalry formed the reserve. The American line soon gave way, and their militia quitted the field; upon which the Royal troops, supposing the victory already gained, engaged with ardour in the pursuit, and were thereby thrown into some disorder. General Morgan's corps, who were supposed to have been routed, then immediately faced about, and threw in a heavy fire upon the King's troops, which occasioned the utmost confusion

363
Exertions
of Lord
Cornwallis
in North
Carolina.

America.
364
Defeat of
Col. Tarle-
ton.

amongst them; and they were at length totally defeated by the Americans. Four hundred of the British infantry were either killed, wounded, or taken prisoners: the loss of the cavalry was much less considerable; but the two three-pounders fell into the hands of the Americans, together with the colours of the 7th regiment; and all the detachment of royal artillery were either killed or wounded in defence of their colours. Lieutenant-colonel Tarleton, however, made another effort; having assembled about 50 of his cavalry, with which he charged and repulsed Colonel Washington's horse, retook his baggage, and killed the Americans who were appointed to guard it. He then retreated to Hamilton's ford, near the mouth of Bullock's creek, carrying with him part of his baggage, and destroying the remainder.

365
Operations
in conse-
quence of
that event.

This defeat of the troops under Tarleton was a severe stroke to Lord Cornwallis, as the loss of his light infantry was a great disadvantage to him. The day after that event, he employed in collecting the remains of Tarleton's corps, and in endeavouring to form a junction with General Leslie, who had been ordered to march towards him with a body of British troops from Wynneshorough. Considerable exertions were then made by part of the army, without baggage, to retake the prisoners in the hands of the Americans, and to intercept General Morgan's corps on its retreat to the Catawba. But that American officer, after his defeat of Tarleton, had made forced marches up into the country, and crossed the Catawba the evening before a great rain, which swelled the river to such a degree, as to prevent the Royal army from crossing for several days; during which time the British prisoners were got over the Yadkin; whence they proceeded to Dan River, which they also passed, and on the 14th of February had reached Court house in the province of Virginia.

366
Lord Corn-
wallis
marches
thro' North
Carolina.

Lord Cornwallis employed a halt of two days in collecting some flour, and in destroying superfluous baggage and all his waggons, excepting those laden with hospital stores, salt, and ammunition, and four reserved empty in readiness for sick or wounded. Being thus freed from all unnecessary incumbrances, he marched through North Carolina with great rapidity, and penetrated to the remotest extremities of that province on the banks of the Dan. His progress was sometimes impeded by parties of the militia, and some skirmishes ensued, but he met with no very considerable opposition. On the first of February, the King's troops crossed the Catawba at M'Cowan's Ford, where General Davidson, with a party of American militia, was posted, in order to oppose their passage; but he falling by the first discharge, the Royal troops made good their landing, and the militia retreated. When Lord Cornwallis arrived at Hillsborough, he erected the king's standard, and invited, by proclamation, all loyal subjects to repair to it, and to stand forth and take an active part in assisting his Lordship to restore order and government. He had been taught to believe that the king's friends were numerous in that part of the country: but the event did not confirm the truth of the representations that had been given. The Royalists were but few in number, and some of them too timid to join the king's standard. There were, indeed, about 200 who were proceeding to Hillsborough, under Colonel Pyle, in order to avow their attachment to the

Royal cause; but they were met accidentally, and surrounded by a detachment from the American army, by whom a number of them are said to have been killed when they were begging for quarter, without making the least resistance. Meanwhile General Greene was marching with great expedition with the troops under his command, in order to form a junction with other corps of American troops, that he might thereby be enabled to put some effectual stop to the progress of Lord Cornwallis.

In other places some considerable advantages were obtained by the royal arms. On the 4th of January, some ships of war with a number of transports on board, which was a large body of troops under the command of Brigadier-general Arnold, arrived at Westover, about 140 miles from the Capes of Virginia, where the troops immediately landed and marched to Richmond, which they reached without opposition, the militia that was collected having retreated on their approach. Lieutenant-colonel Simcoe marched from hence with a detachment of the British troops to Westham, where they destroyed one of the finest foundries for cannon in America, and a large quantity of stores and cannon. General Arnold, on his arrival at Richmond, found there large quantities of salt, rum, sail-cloth, tobacco, and other merchandize, and that part of these commodities which was public property he destroyed. The British troops afterwards attacked and dispersed some small parties of the Americans, took some stores and a few pieces of cannon, and on the 20th of the same month marched into Portsmouth. On the 25th, Captain Barclay, with several ships of war, and a body of troops under the command of Major Craig, arrived in Cape Fear river. The troops landed about nine miles from Wilmington, and on the 28th entered that town. It was understood that their having possession of that town, and being masters of Cape Fear river, would be productive of very beneficial effects to Lord Cornwallis's army.

367
Large
quantities
of Ameri-
can stores
destroyed
by Arnold.

General Greene having effected a junction about the 10th of March with a continental regiment of what were called *eighteen months men*, and two large bodies of militia belonging to Virginia and North Carolina, formed a resolution to attack the British troops under the command of Lord Cornwallis. The American army marched from the High Rock Ford on the 12th of the month, and on the 14th arrived at Guildford. Lord Cornwallis, from the information he had received of the motions of the American general, concluded what where his designs. As they approached more nearly to each other, a few skirmishes ensued between some advanced parties, in which the king's troops had the advantage. On the morning of the 15th, Lord Cornwallis marched with his troops at day-break in order to meet the Americans or to attack them in their encampment. About four miles from Guildford, the advanced guard of the British army, commanded by Lieutenant-colonel Tarleton, fell in with a corps of the Americans, consisting of Lieutenant-colonel Lee's legion, some Back Mountain men and Virginian militia, with whom he had a severe skirmish, but whom he at length obliged to retreat.

The greater part of the country in which the action happened is a wilderness, with a few cleared fields interspersed. The American army, which was superior

to

America.
69
Battle at
Guilford.

to the Royal in point of numbers, was posted on a rising ground about a mile and a half from Guildford court-house. It was drawn up in three lines: the front line was composed of the North Carolinian militia, under the command of the Generals Butler and Eaton; the second line of Virginian militia, commanded by the Generals Stephens and Lawson, forming two brigades; the third line, consisting of two brigades, one of Virginian and one of Maryland continental troops, commanded by General Huger and Colonel Williams. Lieutenant-colonel Washington, with the dragoons of the first and third regiments, a detachment of light infantry composed of continental troops, and a regiment of riflemen under Colonel Lynch, formed a corps of observation for the security of their right flank. Lieutenant-colonel Lee, with his legion, a detachment of light infantry, and a corps of riflemen under Colonel Campbell, formed a corps of observation for the security of their left flank. The attack of the American army was directed to be made by Lord Cornwallis in the following order: On the right, the regiment of Bose and the 71st regiment, led by Major-general Leslie, and supported by the first battalion of guards; on the left, the 23d and 33d regiments, led by Lieutenant-colonel Webster, and supported by the grenadiers and second battalion of guards commanded by Brigadier-general O'Hara; the Yagers and light infantry of the guards remained in a wood on the left of the guns, and the cavalry in the road, ready to act as circumstances might require.

About half an hour after one in the afternoon, the action commenced by a cannonade, which lasted about twenty minutes; when the British troops advanced in three columns and attacked the North Carolinian brigades with great vigour, and soon obliged part of these troops, who behaved very ill, to quit the field: but the Virginian militia gave them a warm reception, and kept up a heavy fire for a long time, till being beaten back, the action became general almost everywhere. The American corps under the Lieutenant-colonels Washington and Lee were also warmly engaged, and did considerable execution. Lieutenant-colonel Tarleton had directions to keep his cavalry compact, and not to charge without positive orders, excepting to protect any of the corps from the most evident danger of being defeated. The excessive thickness of the woods rendered the British bayonets of little use, and enabled the broken corps of Americans to make frequent stands with an irregular fire. The second battalion of the guards first gained the clear ground near Guildford court-house, and found a corps of continental infantry, superior in number, formed in an open field on the left of the road. Desirous of signaling themselves, they immediately attacked and soon defeated them, taking two six-pounders: but as they pursued the Americans into the wood with too much ardour, they were thrown into confusion by a heavy fire, and instantly charged and driven back into the field by Lieutenant-colonel Washington's dragoons, with the loss of the six-pounders they had taken. But the American cavalry were afterwards repulsed, and the two six-pounders again fell into the hands of the British troops. The spirited exertions of Brigadier-general O'Hara and of Lieutenant-colonel Tarleton, greatly contributed to bring the action to a termination. The

British troops having at length broken the second Maryland regiment, and turned the left flank of the Americans, got into the rear of the Virginian brigade, and appeared to be gaining their right, which would have encircled the whole of the continental troops, when general Greene thought it prudent to order a retreat. Many of the American militia dispersed in the woods; but the continental troops retreated in good order to the Reedy Fork River, and crossed at the ford about three miles from the field of action, and there halted. When they had collected their stragglers, they retreated to the iron-works, ten miles distant from Guildford, where they encamped. They lost their artillery and two waggons laden with ammunition. It was a hard-fought action, and lasted an hour and a half. Of the British troops, the loss, as stated by Lord Cornwallis, was 532 killed, wounded, and missing. General Greene, in his account of the action transmitted to the congress, stated the loss of the continental troops to amount to 329 killed, wounded, and missing; but he made no estimate of the loss of the militia. Lieutenant-colonel Stewart was killed in the action; and Lieutenant-colonel Webster, and the Captains Schutz, Maynard, and Goodriche, died of the wounds that they received in it. Brigadier-general O'Hara, Brigadier-general Howard, and Lieutenant-colonel Tarleton, were also wounded. Of the Americans the principal officer killed was Major Anderson of the Maryland line, and the Generals Stephens and Huger were wounded.

The British troops underwent great hardships in the course of this campaign; and in a letter of Lord Cornwallis's to Lord George Germain, dated March 17th, he observed, that "the soldiers had been two days without bread." His Lordship quitted Guildford three days after the battle which was fought in that place; and on the 7th of April arrived in the neighbourhood of Wilmington. Soon after, General Greene, notwithstanding his late defeat, endeavoured to make some vigorous attempts against the king's forces in South Carolina. Lord Rawdon had been appointed to defend the Post of Camden, with about 800 British and provincials; and on the 19th of April General Greene appeared before that place with a large body of continentals and militia. He found it, however, impossible to attempt to storm the town with any prospect of success; and therefore endeavoured to take such a position as should induce the British troops to fall from their works. He posted the Americans about a mile from the town on an eminence which was covered with woods, and flanked on the left by an impassable swamp. But on the morning of the 25th, Lord Rawdon marched out of Camden, and with great gallantry attacked General Greene in his camp. The Americans made a vigorous resistance, but were at last compelled to give way; and the pursuit is said to have been continued three miles. For some time after the action commenced, General Gates entertained great hopes of defeating the British troops; in which, as the Americans were superior in point of numbers, he would probably have succeeded, had not some capital military errors been committed by one or two of the officers who served under him. On the American side Colonel Washington had behaved extremely well in this action, having made upwards of 200 of the Eng-

America.

371
Hardships
endured
by the British troops.

372
General
Greene at
tacked in
his camp
by Lord
Rawdon,
and de-
feated.

370
The Americans defeated.

lib.

America. lish prisoners, with 10 or 12 officers, before he perceived that the Americans were abandoning the field of battle. The loss of the English was about 100 killed and wounded. Upwards of 100 of the Americans were taken prisoners; and, according to the account published by General Greene, they had 126 killed and wounded. After this action, Greene retreated to Rugeley's mills, 12 miles from Camden, in order to collect his troops and wait for reinforcements.

Notwithstanding the advantage which Lord Rawdon had obtained over General Greene at Camden, that nobleman soon after found it necessary to quit that post; and the Americans made themselves masters of several other posts that were occupied by the king's troops, and the garrisons of which were obliged to surrender themselves prisoners of war. These troops were afterwards exchanged under a cartel which took place between Lord Cornwallis and General Greene for the release of all prisoners of war in the southern district.

373 After-wards lays siege to Ninety-six; but is repulsed. After these events, General Greene laid close siege to Ninety-six, which was considered as the most commanding and important of all the posts in the back-country; and on the 19th of June he attempted to storm the garrison, but was repulsed by the gallantry of the British troops, with the loss, as it is said, of 75 killed and 150 wounded. General Greene then raised the siege, and retired with his army behind the Saluda, to a strong situation, within 16 miles of Ninety-six.

374 Destruction of American stores. On the 18th of April a large body of British troops, under the command of Major-general Philips and Brigadier-general Arnold, embarked at Portsmouth in Virginia, in order to proceed on an expedition for the purpose of destroying some of the American stores. A party of light-infantry were sent 10 or 12 miles up the Chickahomany; where they destroyed several armed ships, sundry warehouses, and the American state shipyards. At Petersburg, the English destroyed 4000 hogheads of tobacco, one ship, and a number of small vessels on the stocks and in the river. At Chesterfield court-house, they burnt a range of barracks for 2000 men and 300 barrels of flour. At a place called *Osborn's*, they made themselves masters of several vessels loaded with cordage and flour, and destroyed about 2000 hogheads of tobacco, and sundry vessels were sunk and burnt. At Warwick, they burnt a magazine of 500 barrels of flour, some fine mills belonging to Colonel Carey, a large range of public rope-walks and store-houses, tan and bark houses full of hides and bark, and great quantities of tobacco. A like destruction of stores and goods was made in other parts of Virginia.

375 Unlucky misunderstanding between the British admiral and general. From the account already given of some of the principal military operations of the present year in America, it appears, that though considerable advantages had been gained by the Royal troops, yet no event had taken place from which it could rationally be expected that the final termination of the war would be favourable to Great Britain. It was also a disadvantageous circumstance, that there was a misunderstanding between Admiral Arbuthnot and Sir Henry Clinton, and a mutual disapprobation of each other's conduct. This was manifest from their dispatches to government, and especially from those of General Clinton, whose

expressions respecting the conduct of the admiral were by no means equivocal.

On the 16th of March 1781, a partial action happened off the Capes of Virginia, between the fleet under Admiral Arbuthnot, consisting of seven ships of the line and one fifty-gun ship, and a French squadron, consisting of the same number of ships of the line and one forty-gun ship. Some of the ships in both fleets received considerable damage in the action, and the loss of the English was 30 killed and 73 wounded; but no ship was taken on either side. The British fleet had, however, considerably the advantage; as the French were obliged to retire, and were supposed to be prevented by this action from carrying troops up the Chesapeake, in order to attack General Arnold and impede the progress of Lord Cornwallis. But it was an unfortunate circumstance, that some time before this engagement the *Romulus*, a ship of 44 guns, was captured by the French off the Capes of Virginia.

Lord Cornwallis, after his victory over General Greene at Guildford, proceeded, as we have seen, to Wilmington, where he arrived on the 7th of April. But before he reached that place, he published a proclamation, calling upon all loyal subjects to stand forth and take an active part in restoring good order and government; and declaring to all persons who had engaged in the present rebellion against his majesty's authority, but who were now convinced of their error, and desirous of returning to their duty and allegiance, that if they would surrender themselves with their arms and ammunition at head-quarters, or to the officer commanding in the district contiguous to their respective places of residence, on or before the 20th of that month, they would be permitted to return to their homes upon giving a military parole; they would be protected, in their persons and properties, from all sorts of violence from the British troops; and would be restored, as soon as possible, to all the privileges of legal and constitutional government. But it does not appear that any considerable number of the Americans were allured by these promises to give any evidences of their attachment to the Royal cause.

On the 20th of May, his Lordship arrived at Petersburg in Virginia, where he joined a body of British troops that had been under the command of Major-general Philips; but the command of which, in consequence of the death of that officer, had devolved upon Brigadier-general Arnold. Before this junction he had encountered considerable inconveniences from the difficulty of procuring provisions and forage; so that in a letter to Sir Henry Clinton, he informed him, that his cavalry wanted every thing, and his infantry every thing but shoes. He added, that he had experienced the distresses of marching hundreds of miles in a country chiefly hostile, without one active or useful friend, without intelligence, and without communication with any part of the country.

On the 26th of June, about six miles from Williamsburgh, Lieutenant-colonel Simcoe, and 350 of the queen's rangers, with 80 mounted yagers, were attacked by a much superior body of the Americans; but whom they repulsed with great gallantry and with equal success, making four officers and twenty private men prisoners. The loss of the Americans in this action

376 Action between the British and French fleets off the capes of Virginia.

377 Proclamation by Lord Cornwallis.

378 Different actions.

America. tion is said to have been upwards of 120, and that of the British troops not more than 40.

On the 6th of July an action happened near the Green Springs in Virginia, between a reconnoitring party of the Americans under General Wayne, amounting to about 800, and a large part of the British army under Lord Cornwallis; in which the Americans had 127 killed and wounded, and the loss of the Royal troops is supposed to have been considerably greater. It was an action in which no small degree of military skill and courage was exhibited by the Americans. In a variety of skirmishes, the Marquis la Fayette very much distinguished himself, and displayed the utmost ardour in the American cause.

379
General
Green de-
feated by
Colonel
Stuart.

In South Carolina, an action happened on the 9th of September near the Eata Springs, between a large body of British troops under the command of Lieutenant-colonel Stuart and a much superior body of Americans, said to amount to more than 4000, under the command of General Greene. It was an obstinate engagement, and lasted near two hours; but the Americans were defeated, and two of their six-pounders fell into the hands of the English. The loss, however, of the Royal troops was very considerable; amounting to more than 400 killed and wounded, and upwards of 200 missing.

380
Expediti-
on against
New Lon-
don.

In the course of the same month, General Arnold was sent on an expedition against New London, in Connecticut, where he destroyed a great part of the shipping, and an immense quantity of naval stores, European manufactures, and East and West India commodities. The town itself was also burnt, which is said to have been unavoidable, on account of the explosions of great quantities of gun-powder which happened to be in the store-houses, that were set on fire. A fort, of which it was thought necessary to gain possession in this expedition, was not taken without considerable loss. This was fort Griswold; which was defended by the Americans with great gallantry, and the assault was made by the English with equal bravery. The British troops entered the works with fixed bayonets, and were opposed with great vigour by the garrison with long spears. After a most obstinate defence of near forty minutes, the assailants gained possession of the fort, in which 85 Americans were found dead, and 60 wounded, most of them mortally. Of the British troops Major Montgomery was killed by a spear in entering the American works; and 192 men were also killed and wounded in this expedition.

381
Critical
situation
of Lord
Cornwal-
lis.

Notwithstanding the signal advantages that Lord Cornwallis had obtained over the Americans, his situation in Virginia began by degrees to be very critical; and the rather because he did not receive those reinforcements and supplies from Sir Henry Clinton, of which he had formed expectations, and which he conceived to be necessary to the success of his operations. Indeed, the commander in chief was prevented from sending those reinforcements to Lord Cornwallis which he otherwise might have done, by his fears respecting New York, against which he entertained great apprehensions that General Washington intended to make a very formidable attack. In fact, that able American general appears to have taken much pains, and to have employed great finesse, in order to lead Sir Henry Clinton to entertain this imagination. Letters, ex-

pressive of this intention, fell into the hands of Sir Henry, which were manifestly written with a design that they should be intercepted, and only with a view to amuse and deceive the British general. The project was successful; and by a variety of judicious military manœuvres, in which he completely out-generalled the British commander, he increased his apprehensions about New York, and prevented him from sending proper assistance to Lord Cornwallis. Having for a considerable time kept Sir Henry Clinton in perpetual alarm in New York, though with an army much inferior to the garrison of that city, General Washington suddenly quitted his camp at White Plains, crossed the Delaware, and marched towards Virginia, apparently with a design to attack Lord Cornwallis. Sir Henry Clinton then received information, that the Count de Grasse, with a large French fleet, was expected every moment in the Chesapeake, in order to co-operate with General Washington. He immediately endeavoured, both by land and water, to communicate this information to Lord Cornwallis; and also sent him assurances, that he would either reinforce him by every possible means in his power, or make the best diversion he could in his favour. In the mean time, Lord Cornwallis had taken possession of the posts of York-town and Gloucester in Virginia, where he fortified himself in the best manner he was able.

382
Ineffectual
attempts
to afford
him assist-
ance.

On the 28th of August, Sir Samuel Hood, with a squadron from the West-Indies, joined the squadron under the command of Admiral Graves before New York. It was then necessary, on account of the situation of Lord Cornwallis, that they should immediately proceed to the Chesapeake; but some time appears to have been needlessly lost, though Admiral Hood was extremely anxious that no delay might be made. They arrived, however, in the Chesapeake, on the 5th of September, with 19 ships of the line; where they found the Count de Grasse, who had anchored in that bay on the 30th of August with 24 ships of the line. The French admiral had previously landed a large body of troops, which had been brought from Rhode Island, and who immediately marched to join the American army under General Washington. The British and French fleets came to an action on the same day in the Chesapeake, which the former arrived in the Chesapeake. On board the British fleet 90 were killed and 246 wounded: some of the ships were greatly damaged in the engagement; and the Terrible, a 74 gun ship, was so much shattered, that it was afterwards found necessary to set fire to it. That this action had not been favourable to the English, was manifest from the event: the fleets continued in sight of each other for five days successively, and sometimes were very near; but at length the French fleet all anchored within the Cape, so as to block up the passage. Admiral Graves, who was the commander in chief, then called a council of war, in which it was resolved that the fleet should proceed to New York, that the ships might be there put into the best state for the service: and thus were the French left masters of the navigation of the Chesapeake.

383
Action be-
tween the
British and
French
fleets off
the Ches-
apeake.

Before the news of this action had reached New York, a council of war was held there, in which it was resolved, that 5000 men should be embarked on board the king's ships, in order to proceed to the assistance of Lord Cornwallis. But when it was known that the French

America. French were absolute masters of the navigation of the Chesapeake, it was thought inexpedient to send off that reinforcement immediately. In another council of war, it was resolved, that as Lord Cornwallis had provisions to last him till the end of October, it was advisable to wait for more favourable accounts from Admiral Graves, or for the arrival of Admiral Digby, who was expected with three ships of the line. It was not then known at New York, that Admiral Graves had determined to return with the whole fleet to that port.

384
Danger of
Lord Corn-
wallis in-
creased.

In the mean time, the most effectual measures were adopted by General Washington for surrounding the British army under Lord Cornwallis. A large body of French troops under the command of Lieutenant-General the Count de Rochambeau, with a very considerable train of artillery, assisted in the enterprise. The Americans amounted to near 8000 continentals and 5000 militia. General Washington was invested with the authority of commander in chief of these combined forces of America and France. On the 29th of September, the investment of York Town was complete, and the British army quite blocked up. The day following, Sir Henry Clinton wrote a letter to Lord Cornwallis, containing assurances that he would do every thing in his power to relieve him, and some information concerning the steps that would be taken for that purpose. A duplicate of this letter was sent to his Lordship by Major Cochran on the 3d of October. That gentleman, who was a very gallant officer, went in a vessel to the Capes, and made his way to Lord Cornwallis, through the whole French fleet, in an open boat. He got to York Town on the 10th of the month; and soon after his arrival had his head carried off by a cannon ball.

After the return of Admiral Graves to New York, a council of war was held, consisting of flag and general officers; in which it was resolved, that a large body of troops should be embarked on board the king's ships as soon as they were refitted, and that the exertions of both fleet and army should be made in order to form a junction with Lord Cornwallis. Sir Henry Clinton himself embarked on board the fleet, with upwards of 7000 troops, on the 18th; they arrived off Cape Charles, at the entrance of the Chesapeake, on the 24th, where they received intelligence that Lord Cornwallis had been obliged to capitulate five days before.

385
Late arri-
val of Ge-
neral Clin-
ton.

386
Lord Corn-
wallis's ar-
my obliged
to surren-
der.

It was on the 19th of October that Lord Cornwallis surrendered himself and his whole army, by capitulation, prisoners to the combined armies of America and France, under the command of General Washington. He made a defence suitable to the character he had before acquired, for courage and military skill; but was compelled to submit to untoward circumstances and superior numbers. It was agreed by the articles of capitulation, that the British troops were to be prisoners to the United States of America, and the seamen to the French king, to whose officers also the British vessels found at York Town and Gloucester were to be delivered up. The British prisoners amounted to more than 6000; but many of them, at the time of surrender, were incapable of duty. A considerable number of cannon, and a large quantity of military stores, fell into the hands of the Americans on this occasion.

Nº 16.

As no rational expectation now remained of a subjugation of the colonies, the military operations that succeeded in America were of little consequence. Some inconsiderable actions and skirmishes did indeed take place after that event; in which the refugees chiefly distinguished themselves, and discovered an inveterate animosity against the Americans. On the 5th of May 1782, Sir Guy Carleton arrived at New York, being appointed to the command of the British troops in America in the room of Sir Henry Clinton. Two days after his arrival, he wrote a letter to General Washington, acquainting him, that Admiral Digby was joined with himself in a commission to treat of peace with the people of America; transmitting to him, at the same time, some papers tending to manifest the pacific disposition of the government and people of Britain towards those of America. He also desired a passport for Mr Morgan, who was appointed to transmit a similar letter of compliment to the congress. General Washington declined signing any passport till he had taken the opinion of congress upon that measure; and by them he was directed to refuse any passport for such a purpose. However, another letter was sent to General Washington, dated the 2d of August, and signed by Sir Guy Carleton and Rear-admiral Digby, in which they informed him, that they were acquainted by authority that negotiations for a general peace had already commenced at Paris: that Mr Grenville was invested with full powers to treat with all the parties at war; and was then at Paris in the execution of his commission. They farther informed him, that his Majesty, in order to remove all obstacles to that peace which he so ardently wished to restore, had commanded his ministers to direct Mr Grenville, that the independency of the thirteen provinces should be proposed by him, in the first instance, instead of making it the condition of a general treaty. But some jealousies were entertained by the Americans, that it was the design of the British court either to disunite them, or to bring them to treat of a peace separately from their ally the king of France: they therefore resolved, that any man, or body of men, who should presume to make any separate or partial convention or agreement with the king of Great Britain, or with any commissioner or commissioners under the crown of Great Britain, ought to be considered and treated as open and avowed enemies of the United States of America; and also that those states could not with propriety hold any conference or treaty with any commissioners on the part of Great Britain, unless they should, as a preliminary thereto, either withdraw their fleets and armies, or else, in positive or express terms, acknowledge the independence of the said States. They likewise resolved, that any propositions which might be made by the court of Great Britain, in any manner tending to violate the treaty subsisting between them and the king of France, ought to be treated with every mark of indignity and contempt.

In the month of June, the town of Savannah, and the whole province of Georgia, were evacuated by the king's troops; as was also Charlestown, South Carolina, about the close of the year. In the mean time, the negotiations for peace being continued, provisional articles of peace were signed at Paris on the 30th of November by the commissioner of his Britannic Majesty

America.

387

Sir Guy
Carleton
arrives
at New
York with
powers to
treat of
peace.

388

Resoluti-
ons of con-
gress in
conse-
quence
thereof.

389

Different
places eva-
cuated by
the king's
troops.

390
America
Independ-
ency of
America
acknow-
ledged.

Majesty and the American commissioners, in which his Majesty acknowledged the united colonies of New Hampshire, Massachusetts Bay, Rhode Island, and Providence Plantations, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, and Georgia, to be "free, sovereign, and independent states." They had constituted themselves such on the 4th of July 1776; they had been acknowledged such by the French king on the 30th of January 1778, when he concluded with them a treaty of amity and commerce; Holland had acknowledged them as such April 19th 1782; Sweden acknowledged them as such February 5th 1783; Denmark the 25th February, Spain in March, and Russia in July, the same year.

391
Loss of
men and
treasure
by the
war.

According to the report of the committee appointed for that purpose, the *Foreign Debt* of the United States incurred by the war, amounted to 7,885,085 dollars, and the *Domestic Debt* to 34,115,290, total at 4s. 6d. each, equal to 9,450,084l. Sterling, the interest of which at 6 per cent. is 567,005l. But the cost to Great Britain is moderately computed at 115,654,914l. and the additional annual burthen by it 4,557,575l. since January 1775. As to the loss of men during the unhappy war, the States of America, according to authentic estimates, lost by the sword and in prison near 80,000 men; and by the British returns at New York, the number of soldiers killed in the service amounted to 43,633.

392
General
consequen-
ces.

Such was the end of the contest between Great Britain and America: A contest in which the latter attained to an independent rank among the nations, that may be productive of more important consequences than can yet be foreseen; and in which the former, happily for herself, was forced to relinquish a sovereignty that served only to repress her own internal industry, and retard her prosperity. She has, in the event, only suffered a diminution of unwieldy empire, which has been more than compensated by an increase of population, commerce, revenues, and wealth.

393
Constitu-
tion of the
American
States.

As to the general constitution of the American States:—By the acts of confederation and perpetual union, each of the colonies contracted a reciprocal treaty of alliance and friendship for their common defence, for the maintenance of their liberties, and for their general and mutual advantage; obliging themselves to assist each other against all violence that might threaten all, or any one of them, and to repel in common all the attacks that might be levelled against all, or any one of them, on account of religion, sovereignty, commerce, or under any other pretext whatsoever. Each of the colonies reserved to themselves alone the exclusive right of regulating their internal government, and of framing laws in all matters not included in the articles of confederation.—But for the more convenient management of the general interest of the United States, it was determined, that delegates should be annually appointed in such manner as the legislature of each state should direct, to meet in congress on the first Monday of November of every year, with a power reserved to each state to recal its delegates, or any of them, at any time within the year, and to send others in their stead for the remainder of the year. No state is to be represented in congress by less than two, nor more than seven members; and no person is capable of being a

VOL. I. Part II.

delegate for more than three years, in any term of six years, nor is any person being a delegate, capable of holding any office under the United States, for which he, or any other for his benefit, shall receive any salary, fees, or emolument of any kind. In determining questions in the United States, in congress assembled, each state is to have one vote. Every state is to abide by the determinations of the United States in congress assembled, on all questions which are submitted to them by the confederation. The articles of confederation are to be inviolably observed by every state, and the union is to be perpetual; nor is any alteration, at any time hereafter, to be made in any of them, unless such alteration be agreed to in a congress of the United States, and be afterwards confirmed by the legislature of every state.

The states have been since much employed in deliberations concerning the new-modelling of their government, in order to establish such a form as may be respected abroad, and prove salutary for domestic peace and security. But the several objects of their attention are so various and diffusive, as to render it impossible to give even a summary view of the whole. They are desirous to preserve a republican or democratic government, yet in some measure similar to the government from which they have separated. As a parallel to our King, Lords, and Commons, it has been proposed to have a President, a Senate, and a House of Representatives; with this difference, that the President and Senate are elective: The President to be the grand executor of the laws: Foreign treaties already made, or which may hereafter be made, to be regarded as the supreme law of the land.

The whole territory of the United States contains by computation a million of square miles, in which are 640 millions of acres. Of these, 51 millions are water; deducting which, the total amount of acres of land in the United States is 589 millions.

That part of the United States comprehended between the west temporary line of Pennsylvania on the east, the boundary line between Britain and the United States extending from the river St Croix to the north-west extremity of the lake of the woods on the north, the river Mississippi to the mouth of the Ohio on the west, and the river Ohio on the south (the aforementioned bounds of Pennsylvania), contains by computation about 411,000 square miles, in which are 26,340,000 acres. Deduct for water 4,340,000 acres; there remains 220 millions of acres.

The whole of this immense extent of unappropriated western territory, or vacant unsettled land, containing as above stated 220 millions of acres, has been by the cession of some of the original states, and by the treaty of peace, transferred to the federal government, and is pledged as a fund for sinking the continental debt. It is in contemplation to divide it into new states, with republican constitutions, similar to the old states near the Atlantic Ocean.

AMERICAN NIGHT-SHADE. See PHYTOLACCA.

AMERICAN GROUND-NUT. See ARRACHIS.

AMERICUS VESPUTIUS, a Florentine gentleman, from whom *America* derived its name.—The merchants of Seville having obtained permission to attempt discoveries as private adventurers, sent out four ships in 1499, under the command of Alonzo de Ojeda (who had

America
Americus.

394
Delibera-
tions for
new-mo-
delling
their go-
vernment.

395
Extent of
their terri-
tory.

Amersfort had accompanied Columbus in his second voyage), assisted by Americus Vespucius, who was known to be deeply skilled in the science of navigation. This fleet touched on that part of the western continent already discovered by Columbus, whose track Ojeda followed; and Americus, who was a man of much address, as well as possessed of considerable literary talents, by publishing the first voyages on the subject, and other artful means, gave his name to the New World, in prejudice to the illustrious Genoese. The imposture, though long detected, has been sanctified by time; and the fourth division of the globe, so long unknown to the inhabitants of Europe, Asia, and Africa, still continues to be distinguished by the name of AMERICA.

AMERSFORT, a city in the Netherlands, in the province of Utrecht, seated on the river Ems, E. Long. 5. 20. N. lat. 52. 14. The most remarkable things are, The town-house; the grand palace, which is triangular; the public walk, planted with trees; and the great church, dedicated to St George. The land to the east and south of this city is very fruitful; on the north there is nothing but pasture-ground, and on the west it is woody. Not far from hence is a mountain called *Amersfort-berg*, on which they have planted a vista of trees, which reaches to Utrecht.

AMERSHAM, or **AGMONDESHAM**, a market-town in Buckinghamshire, consisting of about 200 houses, with a free-school, and four alms-houses. It sends two members to parliament, and has a market on Tuesday. It is a rectory rated at 48 l. 16 s. 8 d. in the king's books. The market-house is a very handsome structure. W. long. 0. 15. N. lat. 51. 47.

AMES (William, D. D.) a learned independent divine, famous for his controversial writings, was born in 1576, and educated at Christ's college, in Cambridge. In the reign of King James I. he left the university, and soon after the kingdom, on account of his being unwilling to conform to the rules of the church; and retired to the Hague, where he had not been long before he was invited to accept of the divinity chair in the university of Franeker, in Friesland, which he filled with admirable abilities for above twelve years; during which his fame was so great, that many came from remote nations to be educated under him. He from thence removed to Rotterdam for a change of air, which his health demanded; and here he continued during the remainder of his life. His controversial writings, which compose the greatest part of his works, are chiefly against Bellarmine and the Arminians. He also wrote, 1. A fresh Suit against the Ceremonies. 2. *Lectiones in Psalmos Davidis*. 3. *Medulla Theologiae*; and several pieces relative to the sciences. He died of an asthma, at Rotterdam, in Nov. 1633.

AMESTRATA, a town of Sicily, (Cicero); *Ame-stratos*, (Stephanus); *Amastira* (Silius Italicus); *Mul-tistratos*, (Polybius): Now *Mistretta*, in the Val di Demona, on the river Halesus. It was a very strong fort of the Carthaginians, besieged in vain by the Romans for seven months with considerable loss; at length, after another siege, taken and raised, (Diodor. Siculus).

AMETHYST, a transparent gem of a purple colour, which seems composed of a strong blue and a deep red; and, according as either of those prevails, affording different tinges of purple, sometimes approaching to violet, and sometimes even fading to a pale-rose

colour. Though the amethyst is generally of a purple colour, it is nevertheless sometimes found naturally colourless, and may at any time be easily made so by putting it into the fire; in which pellucid or colourless state, it so resembles the diamond, that its want of hardness seems the only way of distinguishing it. Some derive the name *amethyst* from its colour, which resembles wine mixed with water; whilst others, with more probability, think it got its name from its supposed virtue of preventing drunkenness; an opinion which, however imaginary, prevailed to that degree among the ancients, that it was usual for great drinkers to wear it about their necks. Be this as it will, the amethyst is scarce inferior to any of the gems in the beauty of its colour; and in its purest state is of the same hardness, and at least of equal value, with the ruby and sapphire. It is found of various sizes, from the bigness of a small vetch, to an inch and an half in diameter, and often to much more than that in length. Its shape is extremely various, sometimes roundish, sometimes oblong, and at others flattened, at least on one side; but its most common appearance is in a crystalliform figure, consisting of a thick column, composed of four plants, and terminated by a flat and short pyramid, of the same number of sides; or else, of a thinner and longer hexangular column; and sometimes of a long pyramid, without any column. It makes the gayest figure in the last of these states, but is hardest and most valuable in the roundish and pebble-like form. The amethyst is found in the East and West Indies, and in several parts of Europe; the oriental ones, at least some of the finer specimens, being so hard and bright as to equal any of the coloured gems in value. However, by far the greater number of amethysts fall infinitely short of these; as all the European ones, and not a few of those brought from the East and West Indies, are very little harder than common crystal.

Counterfeit or Falsitious AMETHYST. Spars and crystals tinged red and yellow, &c. are sold for amethysts. The false ones come from Germany, are tinged by vapours in the mines, and contain some lead.

Amethysts may be counterfeited by glass, to which the proper colour or stain is given. There were fine ones made in France about the year 1690, which may even impose on connoisseurs, unless the stone be taken out of the collet.—The method of giving this colour to glass is directed as follows: Take crystal-frit, made with the most perfect and fine tarso: Then prepare a mixture of manganese in powder, one pound; and zaffer prepared, one ounce and a half: Mix these powders well together; and add to every pound of the frit an ounce of this powder. Let it be put into the pots with the frit, not into the already made metal. When the whole has stood long enough in fusion to be perfectly pure, work it into vessels, and they will resemble the colour of the amethyst.

AMETHYST, in heraldry, a term for the purple colour in the coat of a nobleman, in use with those who blazon with precious stones, instead of metals and colours. This, in a gentleman's escutcheon, is called *Purple*; and in those of sovereign princes, *Mercury*.

AMETHYSTEA, **AMETHYST**: A genus of the monogynia order, belonging to the diandria class of plants; and, in the natural method, ranking under the 42d order, *Vorticillatae*. The characters are: The calyx consists of a single-leaved perianthium, bell-shaped, angular,

Amethyst.
Amethystea.

Amethy- gular, semiquinquefid, and persistent: The *corolla* is
stine monopetalous; the border quinquepartite, the lowest
Amianthus division more expanding: The *filamina* consist of two
 slender filaments approximated; the antheræ are simple
 and roundish: The *pistillum* has a four-cleft germen;
 stylus, the size of the stamina; stigmata two, acute:
 No *corolla*: The *seeds* four, gibbous, and shorter than
 the calyx:—There is only one known species.

This plant is a native of Siberia, from whence the seeds were sent to the imperial garden at Petersburg, and thence brought to Britain. It is an annual plant, with an upright stalk, which rises about a foot high. Towards the top it puts forth two or three small lateral branches, garnished with small trifid leaves, sawed on their edges, of a very dark green colour. The flowers appear in June or July, and are produced in small umbels at the extremities of the branches. They are of a fine blue colour, as are also the upper part of the branches, and the leaves immediately under the umbel, so that they make a fine appearance.

Culture. The seeds of the amethystea should be sown in autumn, as they are apt to remain a whole year in the ground if kept till the spring. When the plants come up, nothing else is necessary than to keep them clear of weeds, and to thin them where they are too close. They ought to be sown where they are to remain, as they do not thrive when transplanted.

AMETHYSTINE is applied, in antiquity, to a kind of purple garment dyed of the hue of amethyst. In this sense amethystine differed from *Tyrian* as well as from *hyacinthine* purple, being a kind of medium between both.

AMHAR, or **AMHARA**, a province of Abyssinia, said to extend 40 leagues from east to west. It is considered as the most noble in the whole empire, both on account of its being the usual residence of the Abyssinian monarchs, and having a particular dialect different from all the rest, which, by reason of the emperors being brought up in this province, is become the language of the court and of the politer people. Here is the famed rock Amba-gehen, where the young monarchs were formerly confined. See **AMBA**.

AMHURST (Nicholas), an English poet and political writer, was born at Marden in Kent, and entered of St John's college, Oxford; from whence he was expelled for irregularity of conduct and libertine principles. Retaining great resentment against the university on this account, he abused its learning and discipline, and some of the most respectable characters in it, in a poem published in 1724 called *Oculus Britanniae*, and in a book intitled *Terræ Filius*. He published, a Miscellany of Poems, sacred and profane; and, *The Convocation*, a poem in five cantos, which was a satire on the Bishop of Bangor's antagonists. But he is best known for the share he had in the political paper called *The Craftsman*: though, after having been the drudge of his party for near 20 years, he was as much forgot in the famous compromise of 1742 as if he had never been born; and, when he died in that year of a broken heart, was indebted to the charity of his bookseller for a grave.

AMIANTHUS, or **EARTH-FLAX**, in natural history, a fibrous, flexible, elastic, mineral substance, consisting of short, abrupt, and interwoven filaments. It is found in Germany, in the strata of iron ore, some-

times forming veins of an inch in diameter. Its fibres are so flexible that cloth has been made of them, and the shorter filaments that separate in the washing of the stone may be made into paper in the common manner. For the method of its preparation for manufacture into cloth, see **ASBESTOS**.

Amianthus is classed by Mr Kirwan in the muriatic genus of earths, because it contains about a fifth part of magnesia. Its other constituents are, flint, mild calcareous earth, barytes, clay, and a very small proportion of iron. It is fusible *per se* in a strong heat, and also with the common fluxes. It differs from asbestos in containing some ponderous earth.

AMICABLE, in a general sense, denotes any thing done in a friendly manner, or to promote peace.

AMICABLE Benches, in Roman antiquity, were, according to Pitiscus, lower and less honourable seats allotted for the *judices pedanei*, or inferior judges, who, upon being admitted of the emperor's council, were dignified by him with the title *amici*.

AMICABLE Numbers, such as are mutually equal to the sum of one another's aliquot parts. Thus the numbers 284 and 220 are amicable numbers: for the aliquot parts 1, 2, 4, 5, 10, 11, 20, 22, 44, 55, 110, of 220, are together equal to the other number 284; and the aliquot parts 1, 2, 4, 71, 142, of 284, are together equal to 220.

AMICTUS, in Roman antiquity, was any upper garment worn over the tunica.

AMICTUS, among ecclesiastical writers, the uppermost garment anciently worn by the clergy; the other five being the alba, singulum, stola, manipulus, and planeta. The amictus was a linen garment, of a square figure, covering the head, neck, and shoulders, and buckled or clasped before the breast. It is still worn by the religious abroad.

AMICULUM, in Roman antiquity, a woman's upper garment, which differed from the palla. It was worn both by matrons and courtezans.

AMICUS CURIÆ, a law term, to denote a by-stander who informs the court of a matter in law that is doubtful or mistaken.

AMIDA, a god worshipped by the Japanese, who has many temples erected to him in the island of Japan, of which the principal is at Jedo. The Japanese have such a confidence in their idol Amida, that they hope to attain eternal felicity by the frequent invocation of his name. One of the figures of this idol is represented at Rome.

AMIDA (anc. geog.), a principal city of Mesopotamia (*Liber Notitiæ*); *Ammæa* (Ptolemy); situated on a high mountain, on the borders of Assyria, on the Tigris, where it receives the Nymphius.—It was taken from the Romans, in the time of the emperor Constant, by Sapore king of Persia. The siege is said to have cost him 30,000 men; however, he reduced it to such ruin, that the emperor afterwards wept over it. According to Ammianus Marcellinus, the city was rased; the chief officers were crucified; and the rest, with the soldiers and inhabitants, either put to the sword or carried into captivity, except our historian himself, and two or three more, who, in the dead of the night, escaped through a postern unperceived by the enemy. The inhabitants of Nisibis, however, being obliged to leave their own city by Jovian's treaty with

Amicable
 Amida.

^{Amiens,}
^{Amilcar.} the Persians, soon restored Amida to its former strength; but it was again taken by Cavades in 501, but was restored to the Romans in 503. On the declension of the Roman power, it fell again into the hands of the Persians; but was taken from them by the Saracens in 899. It is now in the possession of the Turks. Here are above 20,000 Christians, who are better treated by the Turks than in other places. A great trade is carried on in this city, of red Turkey leather, and cotton cloth of the same colour. The Arabian name of Amida is *Diarbeker*, and the Turkish one *Kara-Amed*. E. Long. 39. o. N. Lat. 36. 58.

AMIENS, a large handsome city of France, the capital of Picardy. It is agreeably situated on the river Somme, and said to have received its Latin name *Ambianum* from being every where encompassed with water. It is a place of great antiquity; being mentioned by Cæsar as a town that had made a vigorous resistance against the Romans, and where he convened a general assembly of the Gauls after having made himself master of it. The emperors Antoninus and Marcus Aurelius enlarged it; and Constantine, Constans, Julian, and several others, resided here a considerable time. The town is encompassed with a wall and other fortifications; and the ramparts are planted with trees, which form a delightful walk. The river Somme enters Amiens by three different channels, under as many bridges; and these channels, after washing the town in several places, where they are of use in its different manufactures, unite at the other end by the bridge of S. Michael. Here is a quay for the boats that come from Abbeville with goods brought by sea. At the gate of Noyon there is a suburb remarkable for the abbey of S. Achen. Next to this gate you come to that of Paris, where they have a long mall between two rows of trees. The houses are well built: the streets spacious, embellished with handsome squares and good buildings; and the number of inhabitants between 40 and 50 thousand. The cathedral, dedicated to our Lady, is one of the largest and most magnificent churches in France; adorned with handsome paintings, fine pillars, chapels, and tombs; particularly the nave is greatly admired. The other places worth seeing are the palace of the bailiwick, the town-house, the square *des Fleurs*, and the great market-place.

Amiens was taken by the Spaniards, in 1597, by the following stratagem: Soldiers, disguised like peasants, conducted a cart laden with nuts, and let a bag of them fall just as the gate was opened. While the guard was busy in gathering up the nuts, the Spaniards entered and became masters of the town. It was retaken by Henry IV. who built a citadel here.

This town is the seat of a bishop, suffragan of Rheims, as also of a presidial, bailiwick, vidam, a chamber of accounts, and a generality. The bishop's revenue is 30,000 livres. They have some linen and woollen manufactures, and they also make a great quantity of black and green soap. It lies in E. Long. 2. 30. N. Lat. 49. 50.

AMILCAR, the name of several Carthaginian captains. The most celebrated of them is Amilcar Barcas, the father of Hannibal, who during five years infested the coast of Italy; when the Romans, sending out their whole naval strength, defeated him near Tra-

pani, 242 years before Christ; and this put an end to the first Punic war. Amilcar began the second, and landed in Spain, where he subdued the most warlike nations; but as he was preparing for an expedition against Italy, he was killed in battle, 228 years before the Christian æra. He left three sons, whom he had educated, as he said, like three lions, to tear Rome in pieces; and made Hannibal, his eldest son, swear an eternal enmity against the Romans.

AMILICTI, in the Chaldaic theology, denote a kind of intellectual powers, or persons in the divine hierarchy.—The amilicti are represented as three in number; and constitute one of the tryads, in the third order of the hierarchy.

AMIRANTE, in the Spanish polity, a great officer of state, answering to our lord high-admiral.

AMISUS, the chief city of the ancient kingdom of Pontus. It was built by the Milesians, and peopled partly by them, and partly by a colony from Athens. It was at first a free city, like the other Greek cities in Asia; but afterwards subdued by Pharnaces king of Pontus, who made it his metropolis. It was taken by Lucullus in the Mithridatic war, who restored it to its ancient liberty. Close by Amisus stood another city called *Eupatoria*, from Mithridates Eupator its founder. This city was likewise taken by Lucullus, who levelled it with the ground; but it was afterwards rebuilt by Pompey, who united it with Amisus, giving them the name of *Pompeiopolis*. It was taken during the war between Cæsar and Pompey, by Pharnaces king of Pontus, who put most of its inhabitants to the sword; but Cæsar, having conquered Pharnaces, made it again a free city.

AMITERNUM, a town of the Sabines, in Italy, (Livy, Pliny); now extinct: The ruins are to be seen on the level ridge of a mountain, near S. Vittorino, and the springs of the Aternus; not far from Aquila, which rose out of the ruins of Amiternum.

AMITTERE LEGEM TERRÆ, among lawyers, a phrase importing the loss of liberty of swearing in any court: The punishment of a champion overcome or yielding in battle, of jurors found guilty in a writ of attain, and of a person outlawed.

AM-KAS, in history, a name given to a spacious saloon in the palace of the Great Mogul, where he gives audience to his subjects, and where he appears on solemn festivals with extraordinary magnificence. His throne is supported by six large steps of massy gold, set with rubies, emeralds, and diamonds, estimated at 60,000,000 l.

AMMA, among ecclesiastical writers, a term used to denote an abbess or spiritual mother.

AMMAN, or AMMANT, in the German and Belgic policy, a judge who has the cognisance of civil causes.—It is also used among the French for a public notary, or officer, who draws up instruments and deeds.

AMMANIA: A genus of the monogynia order, belonging to the tetrandria class of plants; and in the natural method ranking under the 17th order, *Calycanthemæ*. The characters are: The *calyx* is an oblong, erect, bell-shaped perianthium, with eight striæ, quadrangulated, octodentated, and persistent: The *corolla* is either wanting, or it consists of four ovate expanding petals inserted in the calyx: The *stamina* consist of four bristly filaments the length of the calyx; the anthers

Amilicti,
Ammania.

Ammi there are didymous: The *pistillum* has a large ovate germen, above; the stylus simple and very short, the stigma headed: The *pericarpium* is a roundish four-celled capsule, covered by the calyx: The *seeds* are numerous and small.—Of this genus there are three species enumerated; all of them natives of warm climates. They have no beauty or other remarkable property.

Ammirato.

AMMI, BISHOP'S WEED: A genus of the digynia order, belonging to the pentandria class of plants; and ranking, in the natural method, under the 45th order, *Umbellatae*. The characters are: Of the *calyx* the universal umbel is manifold; the partial one short and crowded; the involucra are pinnatifid, with numerous leaflets: The *corollae* are radiated, and all hermaphrodite: The *stamina* consist of five capillary filaments; the antheræ roundish: The *pistillum* has a germen beneath: the styli are two, and reflected; and the stigmata are obtuse: There is no *pericarpium*; the fruit is roundish, polished, striated, small, and partible: The *seeds* are two, plano-convex, and striated. Of this there are three

Species. 1. The majus, or common bishop's-weed, the seeds of which are used in medicine. 2. The glaucifolium, with all its leaves cut in the shape of a spear. 3. The copticum, or Egyptian bishop's-weed.

Culture, &c. The first is an annual plant; and therefore is to be propagated by seeds sown in the autumn, in the place where the plants are to remain. They will flower in June, and the seeds will ripen in August. This plant will grow in any open situation, but thrives best in a light sandy soil. The second sort is perennial, and very hardy. It thrives best in a moist soil, and may be propagated by seeds in the same manner as the former.

The third species is now no otherwise known than by the figure of its seeds, which were formerly used in medicine, but have long since given place to those of the common kind. The seeds of the ammi copticum are small, striated, of a reddish brown colour, and have a warm pungent taste, and a pleasant smell approaching to that of origanum. They are recommended as stomachic, carminative, and diuretic; but have long been strangers to the shops. The seeds of the ammi majus, which are used in their place, are much weaker both in taste and smell, and without the origanum flavour of the other.

AMMIANUS (Marcellinus), a Grecian and a soldier as he calls himself, was born at Antioch, and flourished under Constantius and the preceding emperors as late as Theodosius. He served under Julian in the east; and wrote in Latin an interesting history, from the reign of Nerva to the death of Valens, in 31 books; of which only 18 remain. Though a Pagan, he speaks with candour and moderation of the Christian religion, and even praises it: his hero is the emperor Julian. He died about the year 390. The best edition of his history is that of Gronovius, in 1693.

AMMIRATO (Scipio), an eminent Italian historian, born at Lecca in Naples in 1531. After travelling over great part of Italy, without settling to his satisfaction, he was engaged by the great duke of Tuscany to write *The History of Florence*; for which he was presented to a canonry in the cathedral there. He wrote other works while in this station; and died in 1600.

AMMOCHRYSOS, from *αμμος*, sand, and *χρυσος*, gold, a name given by authors to a stone very common in Germany, and seeming to be composed of a golden sand. It is of a yellow gold-like colour, and its particles are very glossy, being all fragments of a coloured talc. It is usually so soft as to be easily rubbed to a powder in the hand; sometimes it requires grinding to powder in a mortar, or otherwise. It is used only as sand to strew over writing. The Germans call it *katzengold*. There is another kind of it less common, but much more beautiful, consisting of the same sort of a glossy spangles, but those not of a gold colour, but of a bright red, like vermillion.

Ammon.

AMMODYTES, or **SAND-EEL,** in ichthyology, a genus of fishes belonging to the order of apodes. This fish resembles an eel, and seldom exceeds a foot in length. The head of the ammodytes is compressed, and narrower than the body; the upper jaw is larger than the under; the body is cylindrical, with scales hardly perceptible. There is but one species of the ammodytes, viz. the tobianus, or launce, a native of Europe. This fish gathers itself into a circle, and pierces the sand with its head in the centre. It is found in most of our sandy shores during some of the summer-months: it conceals itself, on the recess of the tides, beneath the sand, in such places where the water is left, at the depth of about a foot; and is in some places dug out, in others drawn up by means of a hook contrived for that purpose. They are commonly used as baits for other fish, but they are also very delicate eating. These fish are found in the stomach of the *Porpefs*; an argument that the last roots up the sand with its nose, as hogs do the ground.

AMMON, anciently a city of Marmarica, (Ptolemy). Arrian calls it a *place*, not a city, in which stood the temple of Jupiter Ammon, round which there was nothing but sandy wastes. Pliny says, That the oracle of Ammon was 12 days journey from Memphis, and among the *Nomi* of Egypt he reckons the *Nomos Ammoniacus*: Diodorus Siculus, That the district where the temple stood, though surrounded with deserts, was watered by dews which fell nowhere else in all that country. It was agreeably adorned with fruitful trees and springs, and full of villages. In the middle stood the acropolis or citadel, encompassed with a triple wall; the first and inmost of which contained the palace; the others the apartments of the women, the relations and children, as also the temple of the god, and the sacred fountain for lustrations. Without the acropolis stood, at no great distance, another temple of Ammon, shaded by a number of tall trees: near which there was a fountain, called that of the sun, or *Solis Fons*, because subject to extraordinary changes according to the time of the day; morning and evening warm, at noon cold, at midnight extremely hot. A kind of fossil salt was said to be naturally produced here. It was dug out of the earth in large oblong pieces, sometimes three fingers in length, and transparent as crystal. It was thought to be a present worthy of kings, and used by the Egyptians in their sacrifices.—From this our sal ammoniac has taken its name.

AMMON, or HAMMON, in heathen mythology, the name of the Egyptian Jupiter, worshipped under the figure of a ram.

Bacchus having subdued Asia, and passing with his army

Ammon, army through the deserts of Africa, was in great want of water: but Jupiter, his father, assuming the shape of a ram, led him to a fountain, where he refreshed himself and his army; in gratitude for which favour, Bacchus built there a temple to Jupiter, under the title of *Ammon*, from the Greek *αμμον*, which signifies *sand*, alluding to the sandy desert where it was built. In this temple was an oracle of great note, which Alexander the Great consulted, and which lasted till the time of Theodosius.

Hammon, the god of the Egyptians, was the same with the Jupiter of the Greeks; for which reason these latter denominate the city which the Egyptians call No-Hammon or the habitation of Ammon, *Diospolis* or the city of Jupiter. He is thought to be the same with Ham, who peopled Africa, and was the father of Mizraim, the founder of the Egyptians.

AMMON, or **BEN-AMMI**, the son of Lot, begot by this patriarch upon his youngest daughter (Gen. xix. 38.) He was the father of the Ammonites, and dwelt to the east of the Dead Sea, in the mountains of Gilead. See **AMMONITIS** and **AMMONITES**.

AMMON (Andreas), an excellent Latin poet, born at Lucca in Italy, was sent by Pope Leo X. to England, in the characters of prothonotary of the Apostolic See, and collector-general of this kingdom. Being a man of singular genius and learning, he soon became acquainted with the principal literati of those times; particularly with Erasmus, Colet, Grocin, and others, for the sake of whose company he resided some time at Oxford. The advice which Erasmus gives him, in regard to pushing his fortune, has a good deal of humour in it, and was certainly intended as a satire on the artful methods generally practised by the selfish and ambitious part of mankind: "In the first place (says he), throw off all sense of shame; thrust yourself into every one's business, and elbow out whomsoever you can; neither love nor hate any one; measure every thing by your own advantage; let this be the scope and drift of all your actions, Give nothing but what is to be returned with usury, and be complaisant to every body. Have always two strings to your bow. Feign that you are solicited by many from abroad, and get every thing ready for your departure. Show letters inviting you elsewhere, with great promises." Ammon was Latin secretary to Henry VIII. but at what time he was appointed does not appear. In 1512 he was made canon and prebendary of the collegiate chapel of St Stephen, in the palace of Westminster. He was likewise prebendary of Wells; and in 1514 was presented to the rectory of Dychial in that diocese. About the same time, by the king's special recommendation, he was also made prebendary of Salisbury. He died in the year 1517, and was buried in St Stephen's chapel in the palace of Westminster. He was esteemed an elegant Latin writer, and an admirable poet. The epistles of Erasmus to Ammon abound with encomiums on his genius and learning.—His works are, 1. *Epistolæ ad Erasmus*, lib. i. 2. *Scotici conflictus historia*, lib. i. 3. *Bucolica vel eclogæ* lib. i. Basil 1546, 8vo. 4. *De rebus nihil*, lib. i. 5. *Panegyricus quidam*, lib. i. 6. *Varii generis epigrammata*, lib. i. 7. *Poemata diversa*, lib. i.

AMMONIAC, a concrete gummy resinous juice, brought from the East Indies, usually in large masses,

composed of little lumps or tears, of a milky colour, **Ammoniac**, but soon changing, upon being exposed to the air, of a yellowish hue. We have no certain account of the plant which affords this juice; the seeds usually found among the tears resemble those of the umbelliferous class. It has been, however, alledged, and not without some degree of probability, that it is an exudation from a species of the *FERULA*, another species of which produces the *asafœtida*. The plant producing it is said to grow in Nubia, Abyssinia, and the interior parts of Egypt. It is brought to the western part of Europe from Egypt, and to England from the Red Sea, by some of the ships belonging to the East India Company trading to those parts. Such tears as are large, dry, free from little stones, seeds, or other impurities, should be picked out, and preferred for internal use; the coarser kind is purified by solution and colature, and then carefully inspissating it; unless this be artfully managed, the gum will lose a considerable deal of its more volatile parts. There is often vended in the shops, under the name of strained gum ammoniacum, a composition of ingredients much inferior in virtue.

Ammoniac has a nauseous sweet taste, followed by a bitter one; and a peculiar smell, somewhat like that of galbanum, but more grateful; it softens in the mouth, and grows of a whiter colour upon being chewed. Thrown upon live coals, it burns away in flame: it is in some measure soluble in water and in vinegar, with which it assumes the appearance of milk; but the resinous part, amounting to about one half, subsides on standing.

Ammoniac is an useful deobstruent, and frequently prescribed for opening obstructions of the abdominal viscera, and in hysterical disorders occasioned by a deficiency of the menstrual evacuations. It is likewise supposed to deterge the pulmonary vessels; and proves of considerable service in some kinds of asthmas, where the lungs are oppressed by viscid phlegm: in this intention, a solution of gum ammoniac in vinegar of squills proves a medicine of great efficacy, though not a little unpleasant. In long and obstinate cholics proceeding from viscid matter lodged in the intestines, this gummy resin has produced happy effects, after the purges and the common carminatives had been used in vain. **Ammoniac** is most commodiously taken in the form of pills; about a scruple may be given every night, or oftener. Externally, it softens and ripens hard tumours: a solution of it in vinegar stands recommended by some for resolving even schirrhous swellings. A plaster made of it and squill-vinegar is recommended by some in white swellings. A dilute mixture of the same is likewise rubbed on the parts, which are also fumigated with the smoke of juniper-berries. In the shops is prepared a solution of it in pennyroyal water, called from its milky colour, *lac ammoniaci*. It is an ingredient also in the squill pills.

Sal AMMONIAC, a volatile salt, of which there are two kinds, ancient and modern. The ancient sort, described by Pliny and Dioscorides, was a native salt, generated in those large inns or caravanferas where the crowd of pilgrims, coming from the temple of Jupiter Ammon, used to lodge; who, in those parts, travelling upon camels, and those creatures when in Cyrene, a province of Egypt, where that celebrated temple stood,

Ammonian stood, urining in the stables, or (say some) in the parched sands, out of this urine, which is remarkably strong, arose a kind of salt, denominated sometimes (from the temple) *Ammoniac*, and sometimes (from the country) *Cyreniac*. Since the cessation of these pilgrimages, no more of this salt is produced there; and, from this deficiency, some suspect there never was any such thing: But this suspicion is removed, by the large quantities of a salt, nearly of the same nature, thrown out by mount *Ætna*. The characters of the ancient sal ammoniac are, that it cools water, turns aqua fortis into aqua regia, and consequently dissolves gold.

The modern sal ammoniac is entirely factitious: for which, see *CHEMISTRY-Index*.

AMMONIAN PHILOSOPHY. See *AMMONIUS*.

AMMONITÆ, in natural history. See *CORNU Ammonis*.

AMMONITES, a people descended from Ammon the son of Lot. The Ammonites destroyed those giants which they called Zamzummims (*Deut. ii. 19, —21.*), and seized upon their country. God forbade Moses, and by him the children of Israel (*id. 19.*), to attack the Ammonites; because he did not intend to give their lands unto the Hebrews. Before the Israelites entered the land of Canaan, the Amorites had by conquest got great part of the countries belonging to the Ammonites and Moabites. This Moses retook from the Amorites, and divided between the tribes of Gad and Reuben. In the time of Jephtha, the Ammonites declared war against the Israelites (*Judges xi.*), under pretence that they detained a great part of the country which had formerly been theirs before the Amorites possessed it. Jephtha declared, that as this was an acquisition which the Israelites had made in a just war, and what they had taken from the Amorites, who had long enjoyed it by right of conquest, he was under no obligation to restore it. The Ammonites were not satisfied with this reason; wherefore Jephtha gave them battle and defeated them. The Ammonites and Moabites generally united whenever there was any design set a-foot of attacking the Israelites. After the death of Othniel (*id. iii.*), the Ammonites and Amalekites joined with Eglon king of Moab to oppress the Hebrews; whom they subdued, and governed for the space of 18 years, till they were delivered by Ehud the son of Gera, who slew Eglon king of Moab. Some time after this, the Ammonites made war against the Israelites, and greatly distressed them. But these were at last delivered by the hands of Jephtha; who having attacked the Ammonites, made a very great slaughter among them (*chap. xi.*). In the beginning of Saul's reign (*1 Sam. xi.*), Naash king of the Ammonites having sat down before Jabesh-gilead, reduced the inhabitants to the extremity of demanding a capitulation. Naash answered, that he would capitulate with them on no other conditions than their submitting to have every one his right eye plucked out, that so they might be made a reproach to Israel: but Saul coming seasonably to the relief of Jabesh, delivered the city and people from the barbarity of the king of the Ammonites. David had been the king of Ammon's friend; and after the death of this prince, he sent ambassadors to make his compliments of condolence to Hanun his son and successor; who, ima-

gining that David's ambassadors were come as spies to observe his strength, and the condition of his kingdom, treated them in a very injurious manner (*2 Sam. x. 4.*). David revenged this indignity thrown upon his ambassadors, by subduing the Ammonites, the Moabites, and the Syrians their allies. Ammon and Moab continued under the obedience of the kings David and Solomon; and, after the separation of the ten tribes, were subject to the kings of Israel till the death of Ahab in the year of the world 3107. Two years after the death of Ahab, Jehoram his son, and successor of Ahaziah, defeated the Moabites (*2 Kings iii.*): but it does not appear that this victory was so complete as to reduce them to his obedience. At the same time, the Ammonites, Moabites, and other people, made an irruption upon the lands belonging to Judah; but were forced back and routed by Jehoshaphat (*2 Chr. xx. 1, 2.*). After the tribes of Reuben, Gad, and the half-tribe of Manasseh, were carried into captivity by Tiglath-pileser in the year 3264, the Ammonites and Moabites took possession of the cities belonging to these tribes. Jeremiah (*xlix. 1.*) reproaches them for it. The ambassadors of the Ammonites were some of those to whom this prophet (*chap. xxvii. 2.—4.*) presented the cup of the Lord's fury, and directed to make bonds and yokes for themselves; exhorting them to submit themselves to Nebuchadnezzar, and threatening them, if they did not, with captivity and slavery. Ezekiel (*xxv. 4.—10.*) denounces their entire destruction; and tells them that God would give them up to the people of the east, who should set their palaces in their country, so that there should be no more mention of the Ammonites among the nations. It is believed that these misfortunes happened to the Ammonites in the fifth year after the taking of Jerusalem, when Nebuchadnezzar made war against all the people that dwelt upon the confines of Judea, in the year of the world 3420.

It is also thought probable, that Cyrus gave the Ammonites and Moabites the liberty of returning into their own country, from whence they had been removed by Nebuchadnezzar: for we see them, in the place of their former settlement, exposed to those revolutions which were common to the people of Syria and Palestine; subject sometimes to the kings of Egypt, and at other times to the kings of Syria. We are told by Polybius, that Antiochus the Great took Rabboth, or Philadelphia, their capital, demolished the walls, and put a garrison in it in 3806. During the persecutions of Antiochus Epiphanes, Josephus informs, that the Ammonites showed their hatred to the Jews, and exercised great cruelties against such of them as lived about their country. Justin Martyr says, That in his time there were still many Ammonites remaining; but Origen assures us, that when he was living they were known only under the general name of Arabians. Thus was the prediction of Ezekiel (*xxv. 10.*) accomplished; who said that the Ammonites should be destroyed in such a manner as not to be remembered among the nations.

AMMONITIS (anc. geog.), a country of Arabia: Petra, occupied by the children of Ammon, whence the appellation. Its limits partly to the west and partly to the north were the river Jabbok, whose course is

Ammonius no where determined; though Josephus says, that it runs between Rabbath-Ammon, or Philadelphia, and Gerasa, and falls into the Jordan.

AMMONIUS, surnamed SACCAS, was born in Alexandria, and flourished about the beginning of the third century. He was one of the most celebrated philosophers of his age; and, adopting with alterations the Eclectic philosophy, laid the foundations of that sect which was distinguished by the name of the *New Platonics*. See ECCLECTICS and PLATONISM.

This learned man was born of Christian parents, and educated in their religion; the outward profession of which, it is said, he never entirely deserted. As his genius was vast and comprehensive, so were his projects bold and singular: For he attempted a general coalition of all sects, whether philosophical or religious, by framing a system of doctrines which he imagined calculated to unite them all, the Christians not excepted, in the most perfect harmony. In pursuance of this design, he maintained, that the great principles of all philosophical and religious truth were to be found equally in all sects; that they differed from each other only in their method of expressing them, and in some opinions of little or no importance; and that, by a proper interpretation of their respective sentiments, they might easily be united into one body. Accordingly, all the Gentile religions, and even the Christian, were to be illustrated and explained by the principles of this universal philosophy; and the fables of the priests were to be removed from Paganism, and the comments and interpretations of the disciples of Jesus from Christianity. In conformity to this plan, he insisted, that all the religious systems of all nations should be restored to their original purity, and reduced to their primitive standard, viz. the ancient philosophy of the East, preserved uncorrupted by Plato: and he affirmed, that this project was agreeable to the intentions of Jesus Christ; whose sole view in descending upon earth was to set bounds to the reigning superstition, to remove the errors that had blended themselves with the religions of all nations, but not to abolish the ancient theology from which they were derived. He therefore adopted the doctrines which were received in Egypt concerning the universe and the Deity, considered as constituting one great whole; concerning the eternity of the world, the nature of souls, the empire of Providence, and the government of the world by dæmons. He also established a system of moral discipline; which allowed the people in general to live according to the laws of their country and the dictates of nature; but required the wise to exalt their minds by contemplation, and to mortify the body, so that they might be capable of enjoying the presence and assistance of the dæmons, and of ascending after death to the presence of the Supreme Parent. In order to reconcile the popular religions, and particularly the Christian, with this new system, he made the whole history of the Heathen gods an allegory, maintaining that they were only celestial ministers, intitled to an inferior kind of worship. And he acknowledged that Jesus Christ was an excellent man, and the friend of God; but alledged that it was not his design entirely to abolish the worship of dæmons, and that his only intention was to purify the ancient religion. This sy-

stem, so plausible in its first rise, but so comprehensive and complying in its progress, has been the source of innumerable errors and corruptions in the Christian church. At its first establishment, it is said to have had the approbation of Athenagoras, Pantænus, and Clemens the Alexandrian, and of all who had the care of the public school belonging to the Christians at Alexandria. It was afterwards adopted by Longinus the celebrated author of the treatise on the Sublime, Plotinus, Herennius, Origen, Porphyry, Jamblichus the disciple of Porphyry, Sopater, Edisius, Eustathius, Maximus of Ephesus, Priscus, Chrysanthius the master of Julian, Julian the Apostate, Hierocles, Proclus, and many others both Pagans and Christians.

The above opinions of Ammonius are collected from the writings and disputations of his disciples the modern Platonics: for he himself left nothing in writing behind him; nay, he imposed a law upon his disciples not to divulge his doctrines among the multitude; which injunction, however, they made no scruple to neglect and violate.

AMMONIUS, surnamed LITHOTOME, a celebrated surgeon of Alexandria; so called from his inventing the operation of extracting the stone from the bladder.

AMMUNITION, a general name for all warlike provisions; but more particularly powder, ball, &c.

Ammunition, arms, utensils of war, gun-powder, imported without licence from his Majesty, are, by the laws of England, forfeited, and triple the value. And again, such licence obtained, except for furnishing his Majesty's public stores, is to be void, and the offender to incur a premunire, and to be disabled to hold any office from the crown.

AMMUNITION, *Bread, Shoes, &c.* such as are served out to the soldiers of an army or garrison.

AMNESTY, in matters of policy, denotes a pardon granted by a prince to his rebellious subjects, usually with some exceptions: such was that granted by Charles II. at his restoration.—The word is formed from the Greek *ἀμνηστία*, the name of an edict of this kind published by Thrasibulus, on his expulsion of the tyrants out of Athens.

AMNIOS, in anatomy, a thin pellucid membrane which surrounds the fœtus in the womb. See FœTUS.

AMOEBÆUM, in ancient poetry, a kind of poem representing a dispute between two persons, who are made to answer each other alternately: such are the third and seventh of Virgil's eclogues.

AMOL, a town of Asia, in the country of the Ussicks, seated on the river Gihon. E. Long. 64. 30. N. Lat. 39. 20.

AMOMUM, GINGER: A genus of the monogynia order, belonging to the monandria class of plants. The characters are: The *calyx* is an obscure three-toothed perianthium, above: The *corolla* is monopetalous, the tubus short, the limbus tripartite: The *stamina* is an oblong filament, with the anthera adjoining: The *pistillum* has a roundish germen, beneath; the stylus is filiform, the stigma obtuse: The *pericarpium* is leathery, subovate, trigonous, trilocular, and three-valved: The *seeds* are numerous.—Of this genus there are four

Species. 1. The zingiber, or common ginger, is a native of the East, and also of some parts of the West Indies;

Amomum. Indies; where it grows naturally without culture. The roots are jointed, and spread in the ground: they put out many green reed-like stalks in the spring, which arise to the height of two feet and an half, with narrow leaves. The flower-stems arise by the side of these, immediately from the root; these are naked; ending with an oblong scaly spike. From each of these scales is produced a single blue flower, whose petals are but little lower than the squamous covering. 2. The zerbumbet, or wild ginger, is a native of India. The roots are larger than those of the first, but are jointed in the same manner. The stalks grow from three to near four feet high, with oblong leaves placed alternately. The flower-stems arise immediately from the root: these are terminated by oblong, blunt, scaly heads; out of each scale is produced a single white flower, whose petals extend a considerable length beyond the scaly covering. 3. The cardamomum, or cardamom, is likewise a native of India; but is little known in this country except by its seeds, which are used in medicine. Of this there is a variety, with smaller fruit, which makes the distinction into cardamomum majus and minus. The first, when it comes to us, is a dried fruit or pod about an inch long, containing, under a thick skin, two rows of small triangular seeds of a warm aromatic flavour. The cardamomum minus is a fruit scarce half the length of the foregoing, but considerably stronger both in smell and taste. 4. The grana paradisi species is likewise a native of the East Indies. The fruit containing the grains of paradise is about the size of a fig, divided into three cells, in each of which are contained two roots of small seeds like cardamoms. They are somewhat more grateful, and considerably more pungent, than cardamoms.

Culture. The first two species are tender, and require a warm stove to preserve them in this country. They are easily propagated by parting the roots in the spring. These should be planted in pots filled with light rich earth, and plunged into a hot-bed of tanner's-bark, where they must constantly remain. Cardamoms and grains of paradise are not cultivated in this country. If we may believe the Abbé Raynal, the former propagate themselves, in those countries where they are natives, without either sowing or planting. Nothing more is required than, as soon as the rainy season is over, to set fire to the herb which has produced the fruit.

Uses. The dried roots of the first species are of great use in the kitchen, as well as in medicine. They furnish a considerable export from some of the American islands. The green roots, preserved as a sweet-meat, are preferable to every other kind. The Indians mix them with their rice, which is their common food, to correct its natural insipidity. This spice, mixed with others, gives the dishes seasoned with it a strong taste, which is extremely disagreeable to strangers. The Europeans, however, who come into Asia without fortunes, are obliged to conform to it. The others adopt it out of complaisance to their wives, who are generally natives of the country.—Ginger is a very useful spice, in cold flatulent colics, and in laxity and debility of the intestines; it does not heat so much as those of the pepper kind, but its effects are much more durable. The cardamoms and grains of paradise have the same medicinal qualities with ginger.—In Jamaica, the common people employ it in baths and fomentations

VOL. I. Part II.

with good success, in complaints of the viscera, in pleurisy, and in obstinate and continued fevers.

AMOMUM Verum, or True Amomum, is a round fruit, about the size of a middling grape; containing, under a membranous cover, a number of small rough angular seeds, of a blackish brown colour on the outside, and whitish within: the seeds are lodged in three distinct cells; those in each cell are joined closely together, so as that the fruit, upon being opened, appears to contain only three seeds. Ten or twelve of these fruits grow together in a cluster; and adhere without any pedicle, to a woody stalk about an inch long; each single fruit is surrounded by six leaves, in form of a cup; and the part of the stalk void of fruit is clothed with leafy scales.—The husks, leaves, and stems, have a light grateful smell, and a moderately warm aromatic taste: the seeds, freed from the husks, are in both respects much stronger; their smell is quick and penetrating, their taste pungent, approaching to that of camphor. Notwithstanding amomum is an elegant aromatic, it has long been a stranger to the shops.

AMOMUM Vulgare. See SISON.

AMONTONS (William), an ingenious experimental philosopher, was born at Paris in 1663. While he was at the grammar-school, he by sickness contracted a deafness that almost excluded him conversation. In this situation, he applied himself to mechanics and geometry; and, it is said, refused to try any remedy for his disorder, either because he deemed it incurable, or because it increased his attention. He studied the nature of barometers and thermometers with great care; and wrote *Observations and Experiments concerning a new Hour-glass, and concerning Barometers, Thermometers, and Hygroscopes*; which, with some pieces in the *Journal des Sçavans*, are all his literary works. When the royal academy was new regulated in 1699, he was admitted a member; and read his *New Theory of Friction*, in which he happily cleared up an important object in mechanics. He died in 1705.

AMORÆANS, a sect or order of gemaric doctors, or commentators on the Jerusalem Talmud. The Amoræans succeeded the Mischnic doctors. They subsisted 250 years; and were succeeded by the Seburæans.

AMORGOS, or **AMURCUS** (anc. geog.), now *Mergo*, not far from Naxos to the east, one of the European Sporades; the country of Simonides the Iambic poet. To this island criminals were banished. It was famous for a fine flax called *Emorgis*.

AMORITES, a people descended from Amorrhæus, according to the Septuagint and Vulgate; Emoræus, according to other expositors; Hæmori, according to the Hebrew; or Emorite, according to our version of the bible; who was the fourth son of Canaan, Gen. x. 16.

The Amorites first of all peopled the mountains lying to the west of the Dead Sea. They had likewise establishments to the east of the same sea, between the brooks of Jabbok and Arnon, from whence they forced the Ammonites and Moabites. Numb. xiii. 30. xxi. 29. Josh. v. 1. and Judges xi. 19, 20. Moses made a conquest of this country from their kings Sihon and Og, in the year of the world 2553.

The prophet Amos (ii. 9.), speaking of the gigantic stature and valour of the Amorites, compares their height with that of cedars, and their strength with that

4 K

that

Amorium, that of an oak. The name Amorite is often taken in Scripture for all Canaanites in general. The lands which the Amorite possessed on this side Jordan were given to the tribe of Judah, and those which they had enjoyed beyond this river were distributed between the tribes of Reuben and Gad.

AMORIUM, a town of Phrygia Major, near the river Sangarius, on the borders of Galatia.—It was taken from the Romans by the Saracens in 668; but soon after retaken by the Romans.—A war breaking out again between these two nations in 837, the Roman emperor Theophylus destroyed Sozopetra the birth-place of the khalif Al' Motasem, notwithstanding his earnest intreaties to him to spare it. This so enraged the khalif, that he ordered every one to engrave upon his shield the word *Amorium*, the birth-place of Theophylus, which he resolved at all events to destroy. Accordingly he laid siege to the place, but met with a vigorous resistance. At length, after a siege of 55 days, it was betrayed by one of the inhabitants who had abjured the Christian religion. The khalif, exasperated at the loss he had sustained during the siege, put most of the men to the sword, carried the women and children into captivity, and levelled the city with the ground. His forces being distressed for want of water on their return home, the Christian prisoners rose upon some of them, and murdered them; upon which the khalif put 6000 of the prisoners to death.—According to the eastern historians, 30,000 of the inhabitants of Amorium were slain, and as many carried into captivity.

AMORPHA, FALSE INDIGO: A genus of the decandria order, belonging to the diadelphia class of plants; and in the natural method ranking under the 32d order, *Papilionacea*. The characters are: The calyx is a single-leaved perianthium, tubular and persistent: The corolla consists of an ovate, concave, erect petal, scarcely larger than, and placed on the upper side of, the calyx: The stamina consist of ten erect unequal filaments, longer than the corolla; the antheræ are simple. The pistillum has a roundish germen; the stylus subulated, and the length of the stamina; the stigma simple: The pericarpium is a lunated unilocular legumen, reflected, larger than the calyx, and tuberculated: The seeds are two, and kidney-shaped. By the corolla alone this genus may be distinguished from all the known plants in the universe: The petals are the banner, the wings and keel are wanting; which is very singular in a papilionaceous corolla.

Of this there is only one known species, a native of Carolina, where the inhabitants formerly made from it a coarse kind of indigo, whence the plant took its name. It rises, with many irregular stems, to the height of 12 or 14 feet. The leaves are late in the spring before their foliage is fully displayed. The ends of their branches are generally destroyed by the frost; or, if they recover it, they have the appearance of being dead; whilst other plants testify their effects of the reviving months. But, notwithstanding these defects, this tree has some other good properties that in part make amends for them. The leaves, when out, which will not be before the middle of May, are admired by all. They are of a pleasant green colour; are very large, beautifully pinnated, the folioles being arranged along the stalk by pairs, and terminate by an odd one.

The flowers are of a purple colour, and show themselves in perfection with us the beginning of July. They grow in spikes, seven or eight inches long, at the ends of the branches, and are of a singular structure. In order to make this tree have its best effect, it should be planted among others of its own growth, in a well-sheltered situation; by which means the ends will not be so liable to be destroyed by the winter's frosts; the branches will not suffer by the violence of the winds; and as it is subject to put out many branches near the root, these indelicacies and imperfections will be concealed; whilst the tree will show itself to the utmost advantage when in blow, by elevating its purple-spiked flowers amongst the others in a pleasing view. The seeds of this plant were first sent to England by Mr Mark Catesby in 1724, from which many plants were raised in the gardens near London. These were of quick growth, and several of them produced flowers in three years.

Culture. The amorpha is most readily propagated by seeds, which ought to be procured annually from America. It may also be propagated by laying down the young branches, which in one year will make good roots; and may then be taken off, and planted either in the nursery, or in the places where they are designed to remain. If they are put into a nursery, they should not remain there more than one year; for as the plants make large shoots, they do not remove well when they have remained long in a place.

AMORTIZATION, in law, the alienation of lands or tenements to a corporation or fraternity and their successors. See **MORTMAIN**.

AMOS, the fourth of the small prophets, who in his youth had been a herdsman in Tekoa, a small town about four leagues southward of Jerusalem, was sent to the king of Bashan, that is, to the people of Samaria, or the kingdom of Israel, to bring them back to repentance, and an amendment of their lives; whence it is thought probable that he was born within the territories of Israel, and only retired to Tekoa on his being driven from Bethel, by Amaziah the priest of the golden calves at Bethel.

The prophet being thus retired to Tekoa, in the kingdom of Judah, continued to prophesy. He complains in many places of the violence offered him, by endeavouring to oblige him to silence. He boldly remonstrates against the crying sins that prevailed among the Israelites, as idolatry, oppression, wantonness, and obstinacy. He likewise reproves those of Judah, such as their carnal security, sensuality, and injustice. He terrifies them both with frequent threatenings, and pronounces that their sins will at last end in the ruin of Judah and Israel, which he illustrates by the visions of a plumb-line and a basket of summer-fruit. It is observable in this prophecy, that as it begins with denunciation of judgment and destruction against the Syrians, Philistines, Tyrians, and other enemies of the Jews, so it concludes with comfortable promises of restoring the tabernacle of David, and erecting the kingdom of Christ. Amos was chosen to the prophetic office in the time of Uzziah king of Judah, and Jeroboam the son of Joash, king of Israel, two years before the earthquake (Amos i. 1.), which happened in the 24th or 25th year of Uzziah, according to the rabbins and most of the modern commentators; or the year

Amos year of the world 3219, when this prince usurped the priest's office, and attempted to offer incense to the Lord: but it is observed, that this cannot be the case, because Jotham the son of Uzziah, who was born in 3221, was of age to govern, and consequently was between 15 and 20 years of age, when his father undertook to offer incense, and was struck with a leprosy. The first of the prophecies of Amos, in order of time, are those of the 7th chapter: the rest he pronounced in the town of Tekoa, whither he retired. He foretold the misfortunes which the kingdom of Israel should fall into after the death of Jeroboam II. who was then living; he foretold the death of Zechariah, the invasion of the lands belonging to Israel by Phul and Tiglath-Pileser kings of Assyria; and he speaks of the captivity of the ten tribes, and their return.

The time and manner of this prophet's death are not known. Some old authors relate that Amaziah, priest of Bethel, provoked by the discourses of the prophet, had his teeth broke, in order to silence him. Others say, that Hosea or Uzziah, the son of Amaziah, struck him with a stake upon the temples, knocked him down, and wounded him much; in which condition he was carried to Tekoa, where he died, and was buried with his fathers; but it is generally thought that he prophesied a long time at Tekoa, after the adventure which he had with Amaziah; and the prophet himself taking no notice of the ill treatment which he is said to have received, is an argument that he did not suffer in the manner they relate.

St Jerom observes, that there is nothing great or sublime in the style of Amos. He applies the words of St Paul (2 Cor. xi. 6.) to him, 'Rude in speech though not in knowledge.' And he farther observes, that he borrows his comparison from the state and profession to which he belonged.

AMOY, an island in the province of Fokien, in China, where the English had a factory: but they have abandoned it on account of the impositions of the inhabitants. Long. 136. 0. Lat. 24. 30. It has a fine port, that will contain many thousand vessels. The emperor has a garrison here of 7000 men.

AMPELIS, the vine, in botany. See **VITIS**.

AMPELIS, the *Chatterer*, in zoology, a genus of birds belonging to the order of passerines; the distinguishing characters of which are, that the tongue is furnished with a rim or margin all round, and the bill is conical and strait. There are seven species, all natives of foreign countries, except the garrulus, which is a native both of Europe and the West Indies. In the former, the native country of these birds is Bohemia; from whence they wander over the rest of Europe; and were once superstitiously considered as presages of a pestilence. They appear annually about Edinburgh in February; and feed on the berries of the mountain-ash. They also appear as far south as Northumberland; and, like the field-fare, make the berries of the white-thorn their food. It is but by accident that they ever appear farther south. They are gregarious; feed on grapes, where vineyards are cultivated; are easily tamed; and are esteemed delicious food. This species is about the size of the blackbird: the bill is short, thick, and black; on the head is a sharp pointed crest reclining backwards: the lower part of the tail is black; the end of a rich yellow; the quill-feathers

are black, the three first tipped with white; the six next have half an inch of their exterior margin edged with fine yellow, the interior with white. But what distinguishes this from all other birds, are the horny appendages from the tips of seven of the secondary feathers, of the colour and gloss of the best red wax.

AMPELITES, **CANNEL-COAL**, or **CANDLE-COAL**, a hard, opaque, fossil, inflammable substance, of a black colour. It does not effervesce with acids. The ampelites, though much inferior to jet in many respects, is yet a very beautiful fossil; and, for a body of so compact a structure, remarkably light. Examined by the microscope, it appears composed of innumerable very small and thin plates, laid closely and firmly on one another; and full of very small specks of a blacker and more shining matter than the rest, which is evidently a purer bitumen than the general mass. These specks are equally diffused over the different parts of the masses. There is a large quarry of it near Alençon in France. It is dug in many parts of England, but the finest is in Lancashire and Cheshire; it lies usually at considerable depths. It makes a very brisk fire, flaming violently for a short time, and after that continuing red and glowing hot a long while; and finally is reduced into a small proportion of grey ashes, the greater part of its substance having flown off in the burning.—It is capable of a very high and elegant polish; and, in the countries where it is produced, is turned into a vast number of toys, as snuff-boxes and the like, which bear all the nicety of turning, and are made to pass for jet.—Husbandmen smear their vines with it, as it kills the vermin which infests them. It is likewise used for the dyeing of hair black. In medicine, it is reputed good in colics, against worms, and of being in general an emollient and discutient; but the present practice takes no notice of it.

AMPELUSIA, (anc. geog.) a promontory of Mauritania Tingitana, called *Cottes* by the natives, which is of the same signification with a town of the same name not far from the river Lixus, near the straits of Gibraltar: now *Cape Spartel*. W. Long. 6. 30. Lat. 36. 0.

AMPHERES, in antiquity, a kind of vessels, wherein the rowers plied two oars at the same time, one with the right hand and another with the left.

AMPHIATHROSIS, in anatomy, a term for such junctures of bones as have an evident motion, but different from the diarthrosis, &c. See **DIARTHROSIS**.

AMPHIARAUS, in pagan mythology, a celebrated prophet, who possessed part of the kingdom of Argos. He was believed to excel in divining by dreams, and is said to be the first who divined by fire. Amphiarus knowing, by the spirit of prophecy, that he should lose his life in the war against Thebes, hid himself in order to avoid engaging in that expedition: but his wife Eriphyle, being prevailed upon by a present, discovered the place in which he had concealed himself; so that he was obliged to accompany the other princes who marched against Thebes. This proved fatal to him; for the earth being split asunder by a thunder-bolt, both he and his chariot were swallowed up in the opening.—Amphiarus, after his death, was ranked among the gods; temples were dedicated to him; and his oracle, as well as the sports instituted to his honour, were very famous.

Amphibia.

AMPHIBIA, in zoology, the name of Linnæus's third class of animals; including all those which live partly in water and partly on land. This class he subdivides into four orders, viz. The amphibia reptiles; the amphibia serpentes; the amphibia nantes; and the amphibia meantes. See ZOOLOGY.

It has been a question whether the animals commonly called *amphibious*, live most in the water or on land. If we consider the words *αμφι* (*utrinque*, both ways), and *βιος* (*vita*, life), from which the term *amphibious* is derived; we should understand, that animals, having this title, should be capable of living as well by land, or in the air, as by water; or of dwelling in either constantly at will: but it will be difficult to find any animal that can fulfil this definition, as being equally qua-

* Dr Par-fens; in a paper read before the Royal Society. It has been a question whether the animals commonly called *amphibious*, live most in the water or on land. If we consider the words *αμφι* (*utrinque*, both ways), and *βιος* (*vita*, life), from which the term *amphibious* is derived; we should understand, that animals, having this title, should be capable of living as well by land, or in the air, as by water; or of dwelling in either constantly at will: but it will be difficult to find any animal that can fulfil this definition, as being equally qua-

1. Of the first order, he particularly considers the phocæ; and endeavours to show, that none of them can live chiefly in the water, but that their chief enjoyment of the functions of life is on shore.

† See the article Phoca.

These animals (he observes) are really quadrupeds†; but, as their chief food is fish, they are under a necessity of going out to sea to hunt their prey, and to great distances from shore; taking care that, however great the distance, rocks or small islands are at hand, as resting-places when they are tired, or when their bodies become too much macerated in the water; and they return to the places of their usual resort to sleep, copulate, and bring forth their young, for the following reasons, viz. It is well known, that the only essential difference (as to the general structure of the heart) between amphibious and mere land animals, or such as never go into the water, is, that in the former the oval hole remains always open. Now, in such as are without this hole, if they were to be immersed in water for but a little time, respiration would cease, and the animal must die; because a great part of the mass of blood passes from the heart by the pulmonary artery through the lungs, and by the pulmonary veins returns to the heart, while the aorta is carrying the greater part of the mass to the head and extremities, &c.

Now the blood passes through the lungs in a continual uninterrupted stream, while respiration is gentle and moderate: but when it is violent, then the circulation is interrupted, for inspiration and expiration are now carried to their extent; and in this state the blood cannot pass through the lungs either during the total inspiration or total expiration of the air in breathing: for, in the former case, the inflation compresses the returning veins; and in the latter, by the collapion of the lungs, these veins are interrupted also; so that it is only between these two violent actions that the blood can pass: and hence it is, that the lives of animals are shortened, and their health impaired, when they are subjected to frequent violent respiration; and thus it is, that when animals have once breathed, they must continue to respire ever after, for life is at an end when that ceases.

There are three necessary and principal uses of respi-

ration in all land-animals, and in those kinds that are counted amphibious.—The first is that of promoting the circulation of the blood through the whole body and extremities. In real fishes, the force of the heart is alone capable of sending the blood to every part, as they are not furnished with limbs or extremities; but in the others mentioned, being all furnished with extremities, respiration is an assistant force to the arteries in sending blood to the extremities; which, being so remote from the heart, have need of such assistance, otherwise the circulation would be very languid in these parts: thus we see, that in persons subject to asthmatic complaints, the circulation grows languid, the legs grow cold and oedematous, and other parts suffer by the defect in respiration. A second use of breathing is, that, in inspiration, the variety of particles, of different qualities, which float always in the air, might be drawn into the lungs, to be insinuated into the mass of blood, being highly necessary to temperate and cool the agitated mass, and to contribute refined pabulum to the finer parts of it, which, meeting with the daily supply of chyle, serves to assimilate and more intimately mix the mass, and render its constitution the fitter for supporting the life of the animal. Therefore it is, that valetudinarians, by changing foul or unwholesome air for a free, good, open air, often recover from lingering diseases.—A third principal use of respiration is, to promote the exhibition of voice in animals; which all those that live on the land do according to their specific natures.

From these considerations it appears, that the phocæ of every kind are under an absolute necessity of making the land their principal residence. But there is another very convincing argument why they reside on shore the greatest part of their time; namely, that the flesh of these creatures is analogous to that of other land animals; and therefore, by over long maceration, added to the fatigue of their chasing their prey, they would suffer such a relaxation as would destroy them. It is well known, that animals which have lain long under water, are reduced to a very lax and even putrid state; and the phoca must bask in the air on shore: for while the solids are at rest, they acquire their former degree of tension, and the vigour of the animal is restored; and while he has an uninterrupted placid respiration, his blood is refreshed by the new supply of air, as explained above, and he is rendered fit for his next cruise: for action wastes the most exalted fluids of the body, more or less, according to its duration and violence; and the restorative rest must continue a longer or shorter time, according to the quantity of the previous fatigue.

Let us now examine by what power these animals are capable of remaining longer under water than land animals.

All these have the oval hole open between the right and left auricles of the heart; and, in many, the canalis arteriosus also; and while the phoca remains under water, which he may continue an hour or two more or less, his respiration is stopped; and the blood, not finding the passage through the pulmonary artery free, rushes through the hole from the right to the left auricle, and partly through the arterial canal, being a short passage to the aorta, and thence to every part of the body, maintaining the circulation: but, upon rising

Amphibia. to come ashore, the blood finds its passage again thro' the lungs the moment he respire.

Thus the foetus in utero, during its confinement, having the lungs compressed, and consequently the pulmonary arteries and veins impervious, has the circulation of the blood carried on through the oval hole and the arterial canal. Now, so far the phoca in the water, and the foetus in utero, are analogous; but they differ in other material circumstances. One is, that the foetus having never respired, remains sufficiently nourished by the maternal blood circulating through him, and continues to grow till the time of his birth, without any want of respiration during nine months confinement: the phoca, having respired the moment of his birth, cannot live very long without it, for the reasons given before; and this hole and canal would be closed in them, as it is in land-animals, if the dam did not, soon after the birth of the cub, carry him so very frequently into the water to teach him; by which practice these passages are kept open during life, otherwise they would not be capable of attaining the food designed for them by Providence.

Another difference is, that the phoca, as was said before, would be relaxed by maceration in remaining too long in the water; whereas the foetus in utero suffers no injury from continuing its full number of months in the fluid it swims in: the reason is, that water is a powerful solvent, and penetrates the pores of the skins of land-animals, and in time can dissolve them; whereas the *liquor amnii* is an insipid soft fluid, impregnated with particles more or less mucilaginous, and utterly incapable of making the least alteration in the cutis of the foetus.

Otters, beavers, and some kinds of rats, go occasionally into the water for their prey, but cannot remain very long under water. "I have often gone to shoot otters (says our author), and watched all their motions: I have seen one of them go softly from a bank into the river, and dive down; and in about two minutes rise, at 10 or 15 yards from the place he went in, with a middling salmon in his mouth, which he brought on shore: I shot him, and saved the fish whole." Now, as all foetuses have these passages open, if a whelp of a true water-spaniel was, immediately after its birth, served as the phoca does her cubs, and immersed in water, to stop respiration for a little time every day, it is probable that the hole and canal would be kept open, and the dog be made capable of remaining as long under water as the phoca.

Frogs, how capable soever of remaining in the water, yet cannot avoid living on land, for they respire; and if a frog be thrown into a river, he makes to the shore as fast as he can.

The lizard kind, such as may be called water-lizards (see *LACERTA*), are all obliged to come to land, in order to deposit their eggs, to rest, and to sleep. Even the crocodiles, who dwell much in rivers, sleep and lay their eggs on shore; and, while in the water, are compelled to rise to the surface to breathe; yet, from the texture of his scaly covering, he is capable of remaining in the water longer by far than any species of the phoca, whose skin is analogous to that of a horse or cow.

The hippopotamus (see *HIPPOPOTAMUS*), who wades into the lakes or rivers, is a quadruped, and re-

mains under the water a considerable time; yet his chief residence is upon land, and he must come on shore for respiration.

The testudo, or sea tortoise (see *TESTUDO*), though he goes out to sea and is often found far from land; yet being a respiring animal, cannot remain long under water. He has indeed a power of rendering himself specifically heavier or lighter than the water, and therefore can let himself down to avoid an enemy or a storm: yet he is under a necessity of rising frequently to breath, for reasons given before; and his most usual situation, while at sea, is upon the surface of the water, feeding upon the various substances that float in great abundance every where about him; these animals sleep securely upon the surface, but not under water; and can remain longer at sea than any other of this class, except the crocodile, because, as it is with the latter, his covering is not in danger of being too much macerated; yet they must go on shore to copulate and lay their eggs.

2. The consideration of these is sufficient to inform us of the nature of the first order of the class of amphibious animals; let us now see what is to be said of the second in our division of them, which are such as chiefly inhabit the waters, but occasionally go on shore.

These are but of two kinds: the eels, and water serpents or snakes of every kind. It is their form that qualifies them for loco-motion on land, and they know their way back to the water at will; for by their structure they have a strong peristaltic motion, by which they can go forward at a pretty good rate: whereas all other kinds of fish, whether vertical or horizontal, are incapable of a voluntary loco-motion on shore; and therefore, as soon as such fish are brought out of the water, after having flounced a while, they lie motionless, and soon die.

Let us now examine into the reason why these vermicular fish, the eel and serpent kinds, can live a considerable time on land, and the vertical and horizontal kinds die almost immediately when taken out of the water: and, in this research, we shall come to know what analogy there is between land-animals and those of the waters. All land-animals have lungs, and can live no longer than while these are inflated by the ambient air, and alternately compressed for its expulsion; that is, while respiration is duly carried on, by a regular inspiration and expiration of air.

In like manner, the fish in general have, instead of lungs, gills or branchiae: and as in land-animals the lungs have a large portion of the mass of blood circulating through them, which must be stopped if the air has not a free ingress and egress into and from them; so, in fish, there is a great number of blood-vessels that pass through the branchiae, and a great portion of their blood circulates through them, which must in like manner be totally stopped, if the branchiae are not perpetually wet with water. So that, as the air is to the lungs in land-animals a constant assistant to the circulation; so is the water to the branchiae of those of the rivers and seas: for when these are out of the water, the branchiae very soon grow crisp and dry, the blood-vessels are shrunk, and the blood is obstructed in its passage; so, when the former are immersed in water, or otherwise prevented from having respiration, the circulation ceases, and the animal dies.

Again,

Amphibia,
Amphibo-
logy.

Again, as land-animals would be destroyed by too much maceration in water; so fishes would, on the other hand, be ruined by too much exsiccation; the latter being, from their general structure and constitution, made fit to bear, and live in, the water; the former, by their constitution and form, to breathe and dwell in the air.

But it may be asked, why eels and water-snakes are capable of living longer in the air than the other kinds of fish? This is answered, by considering the providential care of the great Creator for these and every one of his creatures: for since they were capable of locomotion by their form, which they need not be if they were never to go on shore, it seemed necessary that they should be rendered capable of living a considerable time on shore, otherwise their loco-motion would be in vain. How is this provided for? Why, in a most convenient manner: for this order of fishes have their branchiæ well covered from the external drying air; they are also furnished with a slimy mucus, which hinders their becoming crisp and dry for many hours; and their very skins always emit a mucous liquor, which keeps them supple and moist for a long time: whereas the branchiæ of other kinds of fish are much exposed to the air, and want the slimy matter to keep them moist. Now, if any of these, when brought out of the water, were laid in a vessel without water, they might be preserved alive a considerable time, by only keeping the gills and surface of the skin constantly wet, even without any water to swim in.—

It has been advanced, that *man* may, by art, be rendered amphibious, and able to live under water as well as frogs. As the fœtus lives *in utero* without air, and the circulation is there continued by means of the foramen ovale; by preserving the passage open, and the other parts *in statu quo*, after the birth, the same faculty would still continue. Now, the foramen, it is alleged, would be preserved in its open state, were people accustomed, from their infancy, to hold their breath a considerable time once a-day, that the blood might be forced to resume its pristine passage, and prevent its drying up as it usually does. This conjecture seems, in some measure, supported by the practice of divers, who are taught from their childhood to hold their breath, and keep long under water, by which means the ancient channel is kept open.—A Calabrian monk at Madrid laid claim to this amphibious capacity, making an offer to the king of Spain, to continue twice twenty-four hours under water, without ever coming up to take breath. Kircher gives an account of a Sicilian, named the *fish Colas*, who, by a long habitude from his youth, had so accustomed himself to live in water, that his nature seemed to be quite altered; so that he lived rather after the manner of a fish than a man.

AMPHIBOLOGY, in grammar and rhetoric, a term used to denote a phrase susceptible of two different interpretations. Amphibology arises from the order of the phrase, rather than from the ambiguous meaning of a word.

Of this kind was that answer which Pyrrhus received from the oracle: *Aio te, Æacida, Romanos vincere posse*; where the amphibology consists in this, that the words *te* and *Romanos*, may either of them precede, or either of them follow, the words *posse vincere*, indifferently. See ORACLE.

The English language usually speaks in a more natural manner, and is not capable of any amphibologies of this kind: nor is it so liable to amphibologies in the articles, as the French and most other modern tongues.

AMPHIBRACHYS, in ancient poetry, the name of a foot consisting of three syllables, whereof that in the middle is long, and the other two short; such is the word [ābīrē.]

AMPHICOME, in natural history, a kind of figured stone, of a round shape, but rugged, and beset with eminences, celebrated on account of its use in divination. The word is originally Greek, ἀμφικόμεν, *q. d. utrinque cornata*, or "hairy on all sides." This stone is also called *Erotolos*, ἑρωτόλος, *Amatoria*, probably on account of its supposed power of creating love. The amphicome is mentioned by Democritus and Pliny, though little known among the moderns. Mercatus takes it for the same with the *lapis lumbricatus*, of which he gives a figure.

AMPHICTYONS, in Grecian antiquity, an assembly composed of deputies from the different states of Greece: and resembling, in some measure, the diet of the German empire.—Some suppose the word ἀμφικτιόνες to be formed of ἀμφί, "about," and κτίσις or κτίσις, in regard the inhabitants of the country round about met here in council: others, with more probability, from *Amphictyon*, son of Deucalion, whom they suppose to have been the founder of this assembly: though others will have Acrisius, king of the Argives, to have been the first who gave a form and laws to it.

Authors give different accounts of the number of the Amphictyons, as well as of the states who were intitled to have their representatives in this council. According to Strabo, Harpocration, and Suidas, they were twelve from their first institution, sent by the following cities and states; the Ionians, Dorians, Perhæbians, Bæotians, Magnesians, Achæans, Phthians, Melians, Dolopians, Ænians, Delphians, and Phocians. Æschines reckons no more than eleven; instead of the Achæans, Ænians, Delphians, and Dolopians, he only gives the Thessalians, Oetians, and Locrians. Lastly, Pausanius's list contains only ten, viz. the Ionians, Dolopians, Thessalians, Ænians, Magnesians, Melians, Phthians, Dorians, Phocians, and Locrians.

In the time of Philip of Macedon, the Phocians were excluded the alliance, for having plundered the Delphian temple, and the Lacedæmonians were admitted in their place; but the Phocians, 60 years after, having behaved gallantly against Brenus and his Gauls, were restored to their seat in the Amphictyonic council. Under Augustus, the city Nicopolis was admitted into the body; and to make room for it, the Magnesians, Melians, Phthians, and Ænians, who till then had distinct voices, were ordered to be numbered with the Thessalians, and to have only one common representative. Strabo speaks as if this council were extinct in the times of Augustus and Tiberius: but Pausanias, who lived many years after, under Antoninus Pius, assures us it remained entire in his time, and that the number of Amphictyons was then 30.

The members were of two kinds. Each city sent two deputies, under different denominations; one called ἱερομνημον, whose business seems to have been more immediately

Amphibra-
chys

Amphic-
tyons.

Amphictyons, immediately to inspect what related to sacrifices and ceremonies of religion; the other *Πυλαγορας*, charged with hearing and deciding of causes and differences between private persons. Both had an equal right to deliberate and vote, in all that related to the common interests of Greece. The *hieromnemon* was elected by lot; the *pylagoras* by plurality of voices.

Amphilochus.

Though the Amphictyons were first instituted at Thermopylæ, M. de Valois maintains, that their first place of residence was at Delphi; where, for some ages, the tranquillity of the times found them no other employment than that of being, if we may so call it, church-wardens of the temple of Apollo. In after-times, the approach of armies frequently drove them to Thermopylæ, where they took their station, to be nearer at hand to oppose the enemies progress, and order timely succour to the cities in danger. Their ordinary residence, however, was at Delphi.

Here they decided all public differences and disputes between any of the cities of Greece; but before they entered on business, they jointly sacrificed an ox cut into small pieces, as a symbol of their union. Their determinations were received with the greatest veneration, and even held sacred and inviolable.

The Amphictyons, at their admission, took a solemn oath never to divest any city of their right of deputation; never to avert its running waters; and if any attempts of this kind were made by others, to make mortal war against them: more particularly, in case of any attempt to rob the temple of any of its ornaments, that they would employ hands, feet, tongue, their whole power, to revenge it.—This oath was backed with terrible imprecations against such as should violate it; *e. g.* May they meet all the vengeance of Apollo, Diana, Minerva, &c.; their soil produce no fruit, their wives bring forth nothing but monsters, &c.

The stated terms of their meeting was in spring and autumn; the spring meeting was called *Εαρινή Πυλαία*, that in autumn *Μεσοπωρινή*. On extraordinary occasions, however, they met at any time of the year, or even continued sitting all the year round.

Philip of Macedon usurped the right of presiding in the assembly of the Amphictyons, and of first consulting the oracle which was called *Προμαντεία*.

AMPHIDROMIA, a feast celebrated by the ancients on the fifth day after the birth of a child.

AMPHIDRYON, in ecclesiastical writers, denotes the veil or curtain which was drawn before the door of the bema in ancient churches.

AMPHILOCHIA (anc. geog.), the territory of the city of Argos in Acarnania; *Amphilochium*, (Thucydides); called *Amphilochi* (from the people,) in the lower age, (Stephanus.) A town also of Spain, in Galacia, built by Teucer, and denominated from Amphilochus one of his companions, (Strabo): now *Orense*. W. Long. 8. 20. Lat. 42. 36.

AMPHILOCHIUS, bishop of Iconium, in the fourth century, was the friend of St Gregory Nazianzen and St Basil. He assisted at the first general council of Constantinople in 381; presided at the council of Sidæ; and was a strenuous opposer of the Arians. He died in 394; and his works were published in Greek and Latin at Paris 1644, by Francis Combefis.

AMPHILOCHUS, son of Amphiarus and Eriphyle, was a celebrated diviner. He had an altar erected

to him at Athens, and an oracle at Mallus in Cilicia, which city was founded by him and Mopsus. The answers of this oracle were given by dreams; the party inquiring used to pass a night in the temple, and that night's dream was the answer. Dion Cassius mentions a picture done by order of Sextus Condianus, representing the answer he received of the oracle, in the reign of the emperor Commodus.

AMPHIMACER, in ancient poetry, a foot consisting of three syllables, whereof the first and last are long, and that in the middle short; such is the word [*Cāstītās*.]

AMPHION, son of Jupiter and Antiope; who, according to the poets, made the rocks follow his music; and at his harp the stones of Thebes danced into walls and a regular city.

AMPHIPOLES, in antiquity, the principal magistrates of Syracuse. They were established by Timoleon in the 109th Olympiad, after the expulsion of the tyrant Dionysius. They governed Syracuse for the space of 300 years: and Diodorus Siculus assures us, that they subsisted in his time.

AMPHIPOLIS, a city of Macedonia, an Athenian colony, on the Strymon, but on which side is not so certain: Pliny places it in Macedonia, on this side; but Scylax, in Thrace, on the other. The name of the town *Amphipolis*, however, seems to reconcile their difference; because, as Thucydides observes, it was washed on two sides by the Strymon, which dividing itself into two channels, the city stood in the middle, and on the side towards the sea there was a wall built from channel to channel. Its ancient name was *Εννιά οδοι*, the *Nine Ways*, (Thucydides, Herodotus.) The citizens were called *Amphipolitani*, (Livy.) It was afterwards called *Christopolis*; now *Chrisopoli*, or *Chisopoli*, (Hollstenius.)

AMPHIPOLIS, a town of Syria, on the Euphrates, built by Seleucus, called by the Syrians *Turmeda*, (Stephanus): the same with *Thapsacus*, (Pliny); and supposed to have been only renewed and adorned by Seleucus, because long famous before his time, (Xenophon.)

AMPHIPPIL, in Grecian antiquity, soldiers who, in war, used two horses without saddles, and were dexterous enough to leap from one to the other.

AMPHIPRORÆ, in the naval affairs of the ancients, vessels with a prow at each end. They were used chiefly in rapid rivers and narrow channels, where it was not easy to tack about.

AMPHIPROSTYLE, in the architecture of the ancients, a temple which had four columns in the front, and as many in the aspect behind.

AMPHISBÆNA, in zoology, a genus of serpents belonging to the order of amphibia serpentes, so called from the false notion of its having two heads, because it moves with either end foremost.

The head of the amphisbæna is small, smooth, and blunt; the nostrils are very small; the eyes are minute and blackish; and the mouth is furnished with a great number of small teeth. The body is cylindrical, about a foot long, and divided into about 200 annular convex segments like those of a worm; and it has about 40 longitudinal streaks, of which 12 on each side are in the form of small crosses like the Roman X; the anus is a transverse slit; and the last ring or segment of the belly

Amphimacer,
Amphisbæna.

Amphisbæna, belly has eight small papillæ, forming a transverse line before the anus; the tail, *i. e.* all the space below the anus, is short, consisting of 30 annular segments, without being marked with the cross-lines, and is thick and blunt at the point. The colour of the whole animal is black, variegated with white; but the black prevails most on the back, and the white on the belly. It has a great resemblance to a worm, living in the earth, and moving equally well with either end foremost. There are but two species, viz. 1. The fuliginosa, which answers exactly to the above description, and is found in Libya and in different parts of America. 2. The alba, which is totally white, is a native of both the Indies, and is generally found in ant-hillocks. The bite of the amphisbæna is reckoned to be mortal by many authors; but as it is not furnished with dog-fangs, the usual instruments of conveying the poison of serpents, later writers esteem it not to be poisonous. They feed upon ants and earth-worms, but particularly the latter. See Plate XVI.

AMPHISBÆNA Aquatica, a name given by Bertrutius, Albertus, and several other authors, to that long and slender insect, called by others the *seta aquatica*, and *vermis setarius*. It has the name *amphisbæna*, from its going backwards or forwards with equal ease and celerity. The usual size is four or five inches long, and the thickness of a large hair.

Dr Lister accidentally found out the origin of this worm, in his researches into the history of a very different sort of insect. Dissecting one of the common black beetles dug up in a garden, he found in its belly two of these hair worms, or amphisbæna; and renewing the experiment on other beetles of the same species, he found that they usually contained, one, two, or three of these worms. As soon as the body of the beetle is opened, they always crawl out. When put into water they will live a considerable time, and swim nimbly about; but often put up their heads above water, as if endeavouring to make their escape, and sometimes fastening themselves by the mouth to the sides of the vessel, and drawing their whole bodies after them. These creatures are not only found in the waters, but buried in earth, and sometimes on the leaves of trees, in our gardens and hedges. Phil. Trans. No 83.

AMPHISCII, among geographers, a name applied to the people who inhabit the torrid zone. The Amphiscii, as the word imports, have their shadows one part of the year towards the north, and the other towards the south, according to the sun's place in the ecliptic. They are also called *Ascii*. See ASCII.

AMPHISSA (anc. geog.) the capital of the Locri Oxolæ, 120 stadia (or 15 miles) to the west of Delphi, (Pausanias.) So called, because surrounded on all hands by mountains, (Stephanus.) Hence *Amphissæi*, the inhabitants; who plundered the temple at Delphi, (Demosthenes.)—Also a town of Magna Græcia, at the mouth of the Sagra, on the coast of the Farther Calabria, situated between Locri and Caulona; now called *Rocellia*. *Amphissus* the epithet, (Ovid.)

AMPHITANE, among ancient naturalists, a stone said to attract gold as the loadstone does iron. Pliny says it was found in that part of the Indies where the native gold lay so near the surface of the earth as to be turned up in small masses among the earth of ant-hills; and describes it to have been of a square figure, N° 16.

and of the colour and brightness of gold. The description plainly points out a well-known fossil, called, by Dr Hill, *pyriticubium*: this is common in the mines of most parts of the world; but neither this nor any other stone was ever supposed, in our times, to have the power of attracting gold.

AMPHITHEATRE, in antiquity, a spacious edifice, built either round or oval, with a number of rising seats, upon which the people used to behold the combats of gladiators, of wild beasts, and other sports.

Amphitheatres were at first only of wood; and it was not till the reign of Augustus, that Statilius Taurus built one, for the first time, of stone. The lowest part was of an oval figure, and called *arena*, because, for the conveniency of the combatants, it was usually strewed with sand; and round the arena were vaults styled *caveæ*, in which were confined the wild beasts appointed for the shews.

Above the caveæ was erected a large circular peristyle, or podium, adorned with columns. This was the place of the emperors, senators, and other persons of distinction.

The rows of benches were above the podium. Their figure was circular; and they were entered by avenues, at the end of which were gates called *vomitoria*.

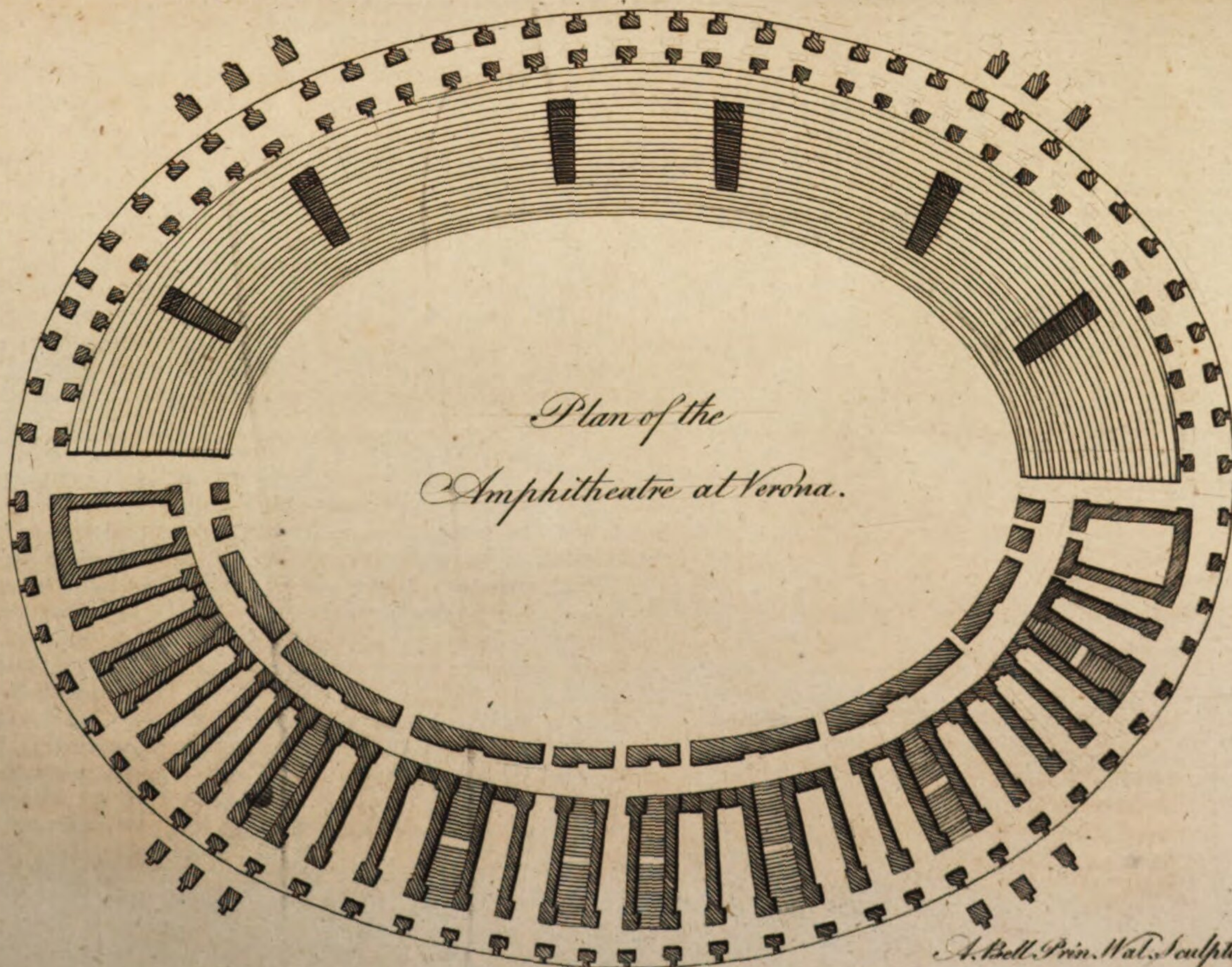
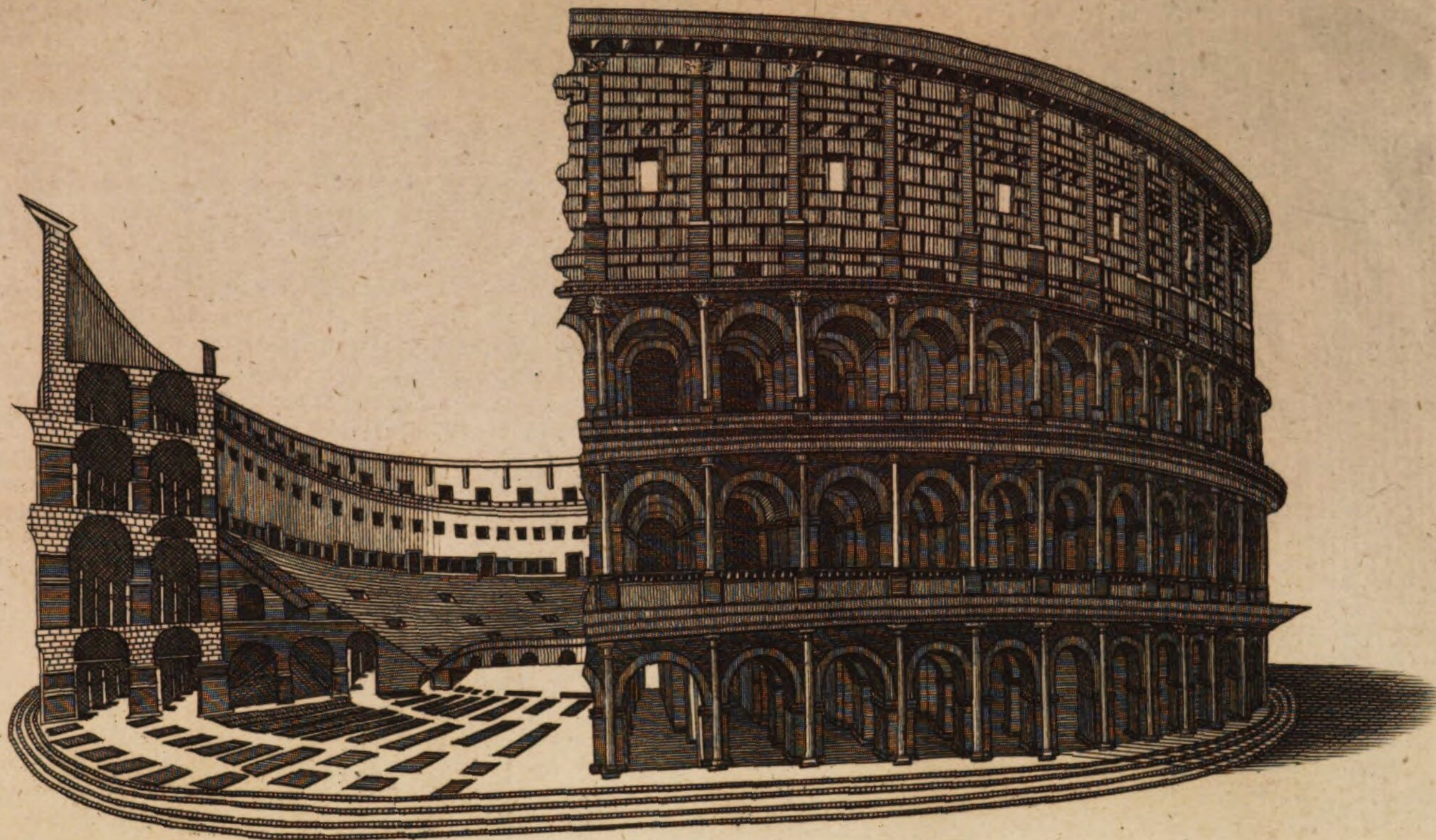
Their theatre was built in form of a semicircle, only exceeding a just semicircle by one fourth part of the diameter; and the amphitheatre was nothing else but a double theatre, or two theatres joined together: so that the longest diameter of the amphitheatre was to the shortest as $1\frac{1}{2}$ to 1.

There are amphitheatres still standing at Rome, at Pola, at Nîmes, &c. The amphitheatre of Vespasian, called the *Coliseum*, and that at Verona in Italy, are the most celebrated now remaining of all antiquity. Remains of amphitheatres are shown also at Arles, Bourdeaux, &c. The amphitheatre at Pola, an ancient republic of Istria, is very entire: it consists of two orders of Tuscan pillars, one over the other. The lower have pedestals, which is extraordinary; this order having scarce ever more than bases to support them. The amphitheatre of Vespasian is computed to have been capable of holding 87,000 spectators. That of Verona is the best preserved: for though most of the great and best stones of the outside are picked out, yet the great vault, on which the rows of the seats are laid, is entire; the rows also (which are 44 in number) are entire. Every row is a foot and a half high, and as much in breadth; so that a man sits conveniently in them; and allowing for a seat a foot and a half, the whole will hold 23,000 persons. Pliny mentions an amphitheatre built by Curio, which turned on large iron pivots; so that of the same amphitheatre two several theatres were occasionally made, whereon different entertainments were sometimes presented at the same time. Mr Brydone (vol. i. 295.) mentions an amphitheatre at Syracuse, the theatre of which is so entire, that the *gradini* for seats still remain; but it is a small theatre, he says, in comparison of the others. See Plate XIV.

AMPHITHEATRE, in gardening, certain dispositions of trees and shrubs on the sides of hilly places, which, if the hill or rising be naturally of a circular figure, always have the best effect. They are to be formed of evergreens, such as hollies, phillereys, laurustines, bays, and

Amphitheatre.

Vespasians Amphitheatre which containd eightyseven thousand spectatators.



A. Bell. Pin. Wat. Sculptor fecit.

Am
trib
I
Am
tio

Amphitrite, and such plants, observing to plant the shortest growing trees in the front, and those which will be the tallest behind, such as pines, firs, cedars of Lebanon, &c.

Amplification. Amphitheatres are also sometimes formed of slopes on the sides of hills, covered only with turf; and, when well kept, they are a great ornament to large gardens.

AMPHITRITE, (*Ἀμφιτρίτη*, from *circumferendo*), in the heathen mythology, the wife of Neptune, and goddess of the sea, sometimes taken for the sea.

AMPHITRYON, son of Alcæus, less known by his own exploits than from his wife Alcmena's adventure. See **ALCMEANA**.

AMPHORA, in antiquity, a liquid measure among the Greeks and Romans. The Roman amphora contained 48 sextaries equal to about seven gallons one pint English wine-measure; and the Grecian or Attic amphora contained one-third more.

AMPHORA was also a dry measure used by the Romans, and contained about three bushels.

AMPHORA, among the Venetians, is the largest measure used for liquids, containing about 16 quarts.

AMPHORARIUM VINUM, in antiquity, denotes that which is drawn or poured into *amphoræ* or pitchers; by way of distinction from *vinum doliare*, or cask wine.—The Romans had a method of keeping wine in *amphoræ* for many years to ripen, by fastening the lids tight down with pitch or gypsum, and placing them either in a situation where the smoke came, or under ground.

AMPHOTIDES, in antiquity, a kind of armour or covering for the ears, worn by the ancient pugiles, to prevent their adversaries from laying hold of that part.

AMPHRYSUS, or **AMPHRYSSUS**, (anc. geog.) a river of Phthiotis a district of Thessaly, running by the foot of mount Othrys, from south to north, into the Enipeus at Thebes of Thessaly; where Apollo fed the herds of king Admetus (Virgil, Lucan). Another Amphrysus in Phrygia, rendering women barren, according to Pliny: Hence the epithet *Amphrysia-cus* (Statius). Also a town of Phocis, at the foot of mount Parnassus, encompassed with a double wall by the Thebans in the war with Philip (Pausanias): *Amphrysia Vates*, in Virgil, denotes the Sibyl.

AMPHTHILL, a town in Bedfordshire, seated pleasantly between two hills, but in a barren soil. W. Long. *o.* 29. N. Lat. 52. 2.

AMPLIATION, in a general sense, denotes the act of enlarging or extending the compass of a thing.

On a medal of the emperor Antoninus Pius, we find the title *Ampliator civium* given him, on account of his having extended the *jus civitatis*, or right of citizenship, to many states and people before excluded from that privilege. In effect, it is generally supposed to have been this prince that made the famous constitution, whereby all the subjects of the empire were made citizens of Rome.

AMPLIATION, in Roman antiquity, was the deferring to pass sentence in certain causes. This the judge did, by pronouncing the word *amplius*; or by writing the letters N. L. for *non liquet*; thereby signifying, that, as the cause was not clear, it would be necessary to bring further evidence.

VOL. I. Part II.

AMPLIFICATION, in rhetoric, part of a discourse or speech, wherein a crime is aggravated, a praise or commendation heightened, or a narration enlarged, by an enumeration of circumstances; so as to excite the proper emotions in the souls of the auditors. Such is the passage in Virgil, where, instead of saying merely that Turnus died, he amplifies the circumstances of his death.

—*Ast illi solvantur frigore membra,
Vitaque cum gemitu fugit indignata sub umbras.*

The masters of eloquence make amplification to be the soul of discourse. See **ORATORY**, n° 39.

AMPLITUDE, in astronomy, an arch of the horizon intercepted between the east or west point and the centre of the sun, or a planet, at its rising or setting; and so is either north and south, or orative and occative.

Magnetical AMPLITUDE, the different rising or setting of the sun from the east or west points of the compass. It is found by observing the sun, at his rising and setting, by an amplitude-compass.

AMPSAGA, a river of ancient Numidia. See **ALGIERS**, n° 57.

AMPSANCTI VALLIS, or **AMPSANCTI LACUS**, a cave or lake in the heart of the Hirpini, or Principato Ultra, near the city Tricento (Cicero, Virgil, Pliny); it is now called *Moffetta*, from Mephitis, the goddess of stench, who had a temple there. The ancient poets imagined that this gulf led to hell. The *Moffetta* is thus described by Mr Swinburn: "We were led into a narrow valley, extending a considerable way to the south-west, and pressed in on both sides by high ridges thickly covered with copses of oak. The bottom of the dell is bare and arid: in the lowest part, and close under one of the hills, is an oval pond of muddy ash-coloured water, not above 50 feet in diameter: it boils up in several places with great force in irregular fits, which are always preceded by a hissing sound. The water was several times spouted up as high as our heads in a diagonal direction, a whirlpool being formed round the tube, like a basin, to receive it as it fell. A large body of vapour is continually thrown out with a loud rumbling noise. The stones on the rising ground that hangs over the pool are quite yellow, being stained with the fumes of sulphur and sal ammoniac. A most nauseous smell rising with the steam obliged us to watch the wind, and keep clear of it, to avoid suffocation. The water is quite insipid both as to taste and smell; the clay at the edges is white, and carried into Puglia to rub upon scabby sheep, on which account the lake is farmed out at 100 ducats a-year. On a hill above this lake stood formerly a temple dedicated to the goddess Mephitis; but I perceived no remains of it."

AMPULLA, in antiquity, a round big-bellied vessel which the ancients used in their baths, to contain oil for anointing their bodies.—Also the name of a cup for drinking out of at table.

AMPULLA, among ecclesiastical writers, denotes one of the sacred vessels used at the altars. Ampullæ were also used for holding the oil used in chrismation, consecration, coronation, &c. Among the ornaments of churches we find frequent mention made of ampuls or vials. In the inventory of the cathedral of Lincoln

Ampulla, we meet with ampuls of crystal, variously enriched with silver feet and covers; one containing a tooth of St Christopher, another a tooth of St Cecily, another a bone of the head of St John Baptist.

Knights of St AMPULLA, belong to an order instituted by Clovis I. king of France; at the coronation they bear up the canopy, under which the ampulla is carried in procession.

AMPURA, a province of the kingdom of Peru, before its conquest by the Spaniards. Here the inhabitants worshipped two lofty mountains from a principle of gratitude, because of the descent of the water from them by which their lands were fertilized. It is said to have been conquered by Virachoca the eighth inca.

AMPURIAS, the capital of the territory of Ampurdan, in Catalonia, seated at the mouth of the river Fluvia, in E. Long. 2. 56. N. Lat. 42. 5. The land about it is barren, full of briars and bulrushes, except in some places, which produce flax.

AMPUTATION, in surgery, the cutting off a limb, or any part, from the body. See **SURGERY-Index**.

AMRAPHEL, the king of Shinar, or Babylonia, confederated with Chedorlaomer, king of the Elamites, and two other kings, to make war against the kings of Pentapolis; that is to say, of Sodom, Gomorrah, and the three neighbouring cities. The kings who were in league with Amraphel worsted those of Pentapolis, plundered their city, and carried off abundance of captives, among whom was Lot, Abraham's nephew: but Abraham pursued them, retook Lot, and recovered all the spoil. See **ABRAHAM**.

AMRAS, a strong castle of Germany, seated in Tirol; by some German writers called *Arx Ambrosiana*, which was a house of pleasure for the archdukes to retire to in the heat of the summer. By others this fort is called *Ombrafs*; a name derived from the design of it, which was to be a shady summer-house. It is most delightfully situated at the foot of a mountain, but has no great external beauty. All the furniture of ordinary use has been carried away; yet it is still remarkable for its galleries, which contain a very large collection of antiquities, and both natural and artificial curiosities. It excels all others in its curious collection of armour and coats of mail, many of which belonged to very great men. There is also a great collection of gold medals, which weigh, as they affirm, about 16 pound; there are also 3000 cameos and intaglios, but few of them very fine. A great part of these antiquities were sent to this place by Charles V. On the walls and cieling there are some very good paintings; and, among the rest, they have an admirable picture of Noah's ark, done by Bassano, for which the grand duke of Tuscany is said to have offered 100,000 crowns. They have a library, which is not in very good order; and a gallery full of busts and other pieces of antiquity, besides many other apartments adorned with pictures of great value. E. Long. 11. 40. N. Lat. 47. 0.

AMSANCTI. See **AMPSANCTI**.

AMSBURY, or **AMBERSBURY**, a town in Wiltshire, lying in W. Long. 1. 20. N. Lat. 51. 29. It is the *Pagus Ambri*, famous for a monastery built by

one Ambrus, and afterwards for a nunnery of noble women. There is a nobleman's seat here, built by Inigo Jones, to which new works were added under the direction of Lord Burlington. It is 80 miles west of London, and six miles north of Salisbury.

AMSDORFIANS, in church-history, a sect of Protestants in the 16th century, who took their name from Amstdorf their leader. They maintained, that good works were not only unprofitable, but were obstacles to salvation.

AMSTERDAM, the capital city of the province of Holland and of the United Netherlands, is seated on the river Amstel and an arm of the sea called the *Wye*. The air is but indifferent, on account of the marshes that surround it, and render the city almost inaccessible: but this inconvenience is abundantly recompensed by the utility of its commerce, which the port serves greatly to promote; for it will contain above a thousand large ships.

In 1204, it was nothing but a small castle, called *Amstel* from the name of the river, which its lords made a retreat for fishermen, who at first lived in huts covered with thatch: but it soon became considerable, and had a bridge and towers built about it, insomuch that it rose to a small city; though, till the year 1490, it was surrounded with nothing but a weak pallisado. The walls were then built with brick, to defend it from the incursions of the inhabitants of Utrecht, with whom the Hollanders were often quarrelling; but some months afterwards it was almost reduced to ashes. In 1512, it was besieged by the people of Guelderland; who, not being able to take it, set fire to the ships in the harbour. In 1525, an Anabaptist leader, with 600 of his followers, got into the city in the night-time, attacked the town-house, and defeated those that made any resistance. At length they barricaded, with wool and hop-sacks, the avenues to the market-place, where these enthusiasts were posted; and so put a stop to their fury till day appeared, at which time the citizens fell upon them on all sides, and forced them to retire into the town-house, where most of them were cut to pieces. About ten years after, there was another tumult raised by a parcel of fanatics, consisting of men and women, who ran about the streets stark naked, and had a design of making themselves masters of the town-house. Their shrieks and cries, which were dreadful enough, soon alarmed the inhabitants, who seized the greatest part of them, and gave them the chastisement they deserved.

Amsterdam was one of the last cities that embraced the reformed religion. It was besieged by the Hollanders in 1578, and submitted after a siege of ten months. One article of the capitulation was, a free exercise of the Roman-catholic religion: but this was not observed by the Protestants; for they soon drove the ecclesiastics, monks, and nuns, out of the city, broke the images, and demolished the altars. From this time it became the general rendezvous of all nations and of every sect, which raised it to that degree of grandeur and opulence it now enjoys. The inhabitants were often obliged to enlarge the bounds of their city, and in 1675 it was increased to its present extent. It was surrounded with a brick wall, and a large ditch 80 feet broad full of running water. The walls were fortified with

Amsterdam with 26 bastions, on each of which there is now a wind-mill. There are eight gates towards the land, and one towards the water.

Amsterdam being seated on a marshy soil, is built on piles of wood; for which reason no coaches are allowed, except to great men and physicians, who pay a tax for that privilege; and all kinds of goods are drawn on sledges. It stands so low, that they would be exposed to inundations if they did not secure themselves by dykes and sluices. The finest streets are, the Keyfar's Graft, or Emperor's Canal; the Heer Graft, or Lords Canal; the Cingel; and the street of Haerlem. The principal canal is remarkable for its houses, which are magnificent structures of an equal height. Here are three prodigious sluices, and a great number of canals, which cross the city in many parts, and render the streets clean and pleasant. The canals are deep, their sides are lined with hewn stone, they have generally rows of trees planted on each side, and many stone-bridges over different parts of them.

The finest is that called the *Ammarack*, which is formed by the waters of the Amstel, into which the tide comes up, and on the sides of which are two large quays. This canal has several bridges. The principal is that next the sea, called *Pont-Neuf*, or the *New Bridge*: it is 600 feet long, and 70 broad, with iron balustrades on each side; it has 36 arches, of which 11 are very high, and eight are shut up to inclose the yachts. From this bridge there is a most charming prospect of the city, port, and sea. The port is a mile and a half in length, and above 1000 paces in breadth. It is always filled with a multitude of vessels, which look like a forest, or rather a floating city. The streets in general are well paved, and the houses built of brick or stone. Towards the sides of the haven, the city is inclosed with great poles driven into the ground, which are joined by large beams placed horizontally. There are openings to let the ships in and out, which are shut every night at the ringing of a bell.

Amsterdam is computed to be half as big as London, including the fortifications, and almost as populous in proportion. There are people here of almost every nation and religion in Europe, who are all tolerated in their respective persuasions; but none admitted to any share in the government except the Calvinists. There are eleven churches for the Dutch of the established or Calvinistical religion, with two French and one High Dutch. The English have also three churches in this city; one for the Presbyterians, whose ministers are paid by the magistrates; a second for those of the church of England, whose minister is paid by his Britannic Majesty; and a third for the Brownists, who maintain their own ministers. None but the Calvinists are allowed to have bells, and their ministers are maintained by the magistrates. All these churches or congregations make up only a third part of the inhabitants of the city. The Roman Catholics, who have 27 houses or chapels for their worship, form another third part. Here they have a long square of houses for their beguines (a kind of nuns) to live in; who are not shut up in cloisters as other nuns in Roman Catholic countries, but have liberty to walk abroad, and may even marry when they are tired of this kind of life. These chapels of the Roman Catholics have no bells al-

lowed them, being looked upon as conventicles, and Amsterdam may be shut up and opened according as the government pleases. The other third part of the city is made up of Jews, Lutherans, Arminians, Anabaptists, &c. none of whom, as was said of the Roman Catholics, are allowed to have bells in their churches. Those who marry, and are not of the established religion, are obliged to be joined first by the magistrates, and then they may perform the ceremony in their own assemblies. The Jews, who are very considerable in this place, have two synagogues; one of which, namely the Portuguese, is the largest in Europe. Within the court-yard, where their synagogue stands, they have several rooms or schools, where their children are taught Hebrew, and very carefully instructed in the Jewish religion.

The most remarkable of the religious buildings is the New Church, dedicated to St Catharine. It was begun in the year 1408, others say 1414; and was 100 years a-building. It had the misfortune of being burnt in the year 1645, but was in a short time after built in a more magnificent manner. The foundation of a steeple is laid before this church, which was designed to be very high. The piles on which it was to be erected are not above 100 feet square, and yet they are 6334 in number, and those very large. Nevertheless it was thought that these vast piles, or rather the ground, were not able to support the prodigious weight they intended to lay upon it; for which reason the steeple remains unfinished. The pulpit is a masterpiece of the kind, where the four evangelists and many other curious pieces of sculpture are represented. The glass-windows are adorned with paintings, among which the emperor Maximilian is described, presenting an imperial crown to the burgomasters of Amsterdam for the crest of the arms of this city. The organ is very large, and reckoned one of the best in the world. It has a set of pipes that counterfeit a chorus of voices, and has 52 whole stops, besides half stops, with two rows of keys for the feet, and three rows of keys for the hands. Those who hear it play for the first time imagine they hear a human voice. The grate dividing the chancel from the body of the church is all of Corinthian brass. The branches of candlesticks are the richest in the Seven Provinces. There is a very fine marble monument erected to Admiral Ruyter, who was killed at Messina.

The public buildings of a civil nature are very magnificent. The stadthouse was founded in 1648. It is built upon 14,000 wooden piles; and its front is 282 feet long, its sides 255 feet, and its height to the roof 116. There is a marble pediment in the front, whereon a woman is carved in relievo, holding the arms of the city; she is seated in a chair, supported by two lions, with an olive-branch in her right hand; on each side are four Naiads, who present her with a crown of palm and laurel, and two other marine goddesses present her with different sorts of fruit; besides, there is Neptune with his trident, accompanied with Tritons, a sea-unicorn, and a sea-horse. On the top stand three statues in bronze, representing Justice, Strength, and Plenty. On the top of the structure is a round tower, 50 feet above the roof, adorned with statues, and an harmonious chime of bells, the biggest of which weighs about 7000 pounds, and the next 6000. They are made to

Amsterdam play different tunes every month. It has not one handsome gate, but only seven doors to answer to the number of the United Provinces. On the floor of the great hall are two globes, the celestial and terrestrial, which are 22 feet in diameter and 69 in circumference. They are made of black and white marble, and are inlaid with jasper and copper. In general, all the chambers are enriched with paintings, carvings, and gildings. While this stadthouse was building, the old one was set on fire, and consumed with all the archives and registers.

Under the stadthouse is a prodigious vault, wherein is kept the bank of Amsterdam, where there is a vast quantity of ingots both of gold and silver, as also bags, which are supposed to be full of money. The doors are proof against petards, and are never opened but in the presence of one of the burgomasters. The prisons for debtors and criminals are likewise under the stadthouse; as also the guard-room for the citizens, wherein the keys of the city are locked every night. At the end of the great hall is the schepens or aldermens chamber, where civil causes are tried. Besides these, there are the chambers of the senate and council, the burgomasters chamber, the chambers of accounts, &c. In the second story is a large magazine of arms; and on the top of the building are six large cisterns of water, which may be conveyed to any room in the house in case of fire; to prevent which the chimneys are lined with copper.

The bourse, or exchange, where the merchants assemble, is all of free-stone, and built upon 2000 wooden piles. Its length is about 250 feet, and its breadth 140. The galleries are supported by 26 marble columns, upon each of which are the names of the people that are to meet there. They are all numbered; and there is a place fixed for every merchandise under some one of these numbers. On the right hand of the gate is a superb stair-case which leads to the galleries; on one side of which there are several shops, and on the other a place to sell clothes. It is not unlike the royal exchange in London.

The admiralty-office is in a house which belonged formerly to the princes of Orange. The arsenal for their men of war is in the harbour. This is a very handsome building, 200 feet long, and 22 broad. The ground floor is filled with bullets; the second floor contains the arms and cordage; the third their sails, pulleys, flags, &c. This arsenal contains a great many curiosities; among the rest an Indian canoe brought from the straits of Davies, and a conservatory of water on the top of the house that holds 1600 tuns of water, which may be distributed in case of fire into 16 different parts by leaden pipes. Hard by this edifice you see the dock or yard where they build their men of war. This dock is 508 feet long, and contiguous to it are houses for lodging the ship-carpenters. The dock is plentifully supplied with every thing necessary for the construction of ships.

The East India Company occupy a large building divided into several offices or apartments. In some of those they have great stores of packed goods, and likewise a room with all sort of drugs, tea, wax, ambergrise, and musk. Here they have a magazine full of medicaments for surgeons chests, to furnish the company's ships and garrisons in the Indies; as also

largemagazines of nutmegs, cloves, mace, and cinnamon. Amsterdam In the court-yard there is a guard-chamber, where every night the house-keeper has a watch; and on the other side of the gate there is a chemist, who with his men prepares medicines for the Indies; and adjoining to this court-yard is their warehouse and packhouse for pepper and gross goods. In the new part of the city they have a magazine or palace, which may properly be called an *arsenal*. The ground on which this building stands is 2000 feet, and square every way, reckoning the moats or burgwall about it. The two rope-alleys are 1800 feet long, on the backside of which is a store of 500 large anchors besides small ones. In this arsenal they build the ships belonging to the India chamber of Amsterdam; for which reason they have all sorts of workhouses here for the artificers that serve the company.

The academy called the *Illustrious School*, is likewise a very fine building. It was formerly a convent belonging to the nuns of St Agnes. Here they teach Latin, the oriental languages, theology, philosophy, history, &c. The lawyers and physicians have likewise their schools.

Besides these, there are several hospitals, or houses for orphans, for poor widows, for sick persons, and for mad people; all which are regulated with much prudence. The Rasp-house, which was formerly a nunnery, is now a sort of a workhouse for men that behave ill. They are commonly set to saw or rasp Brasil wood; and if they will not perform their task, they are put into a cellar which the water runs into, where, if they do not almost constantly ply the pump, they run the risk of being drowned. There is likewise a spin-house for debauched women, where they are obliged to spin wool, flax, and hemp, and do other work. All the hospitals are extremely neat, and richly adorned with pictures. They are maintained partly by voluntary contributions, which are raised by putting money into the poor's boxes fixed up all over the city; and partly by taxing all public diversions, as well at fairs as elsewhere. Likewise every person that passes through any of the gates at candle-light pays a penny for the same uses. These charities are taken care of by certain officers called *deacons*. The governors are nominated by the magistrates out of the most considerable men in the city.

The common sort have places of diversion called *Spiel-houses*, where there are music and dancing. They are much of the same kind as the hops which were so frequent about London. If strangers go there, they must take care not to make their addresses to a woman that is engaged to any other man.

There are two suburbs to this city; one at the gate of the regulars; and the other goes as far as Overtoon, a village a little way from Amsterdam, where boats which come from Leyden are rolled over land upon wooden rollers. There is likewise in this city an hospital for those that are infected with the plague; which was built in the year 1630, and has 360 windows.

This city is governed by a senate or council, which consists of 36 persons, called a *Vroedschap*, who enjoy their places for life; and when any of them dies, the remainder choose another in his stead. This senate elects deputies to be sent to the States of Holland, and appoints the chief magistrates of the city, called *Burgomasters*.

Amsterdam masters or *Echevins*, who are like our aldermen. The number is twelve; out of which four are chosen every year to execute the office, and are called *Burgomasters-regent*. Three of these are discharged every year, to make room for three others. One of the four is kept in to inform the new ones of the state of affairs, and also presides the three first months in the year, and the others three months each; so that, when they are in this office, they may be compared to the lord mayor of the city of London. These alterations and appointments are made by their own body. They dispose of all inferior offices which become vacant during their regency. They have likewise the direction of all public works, which regard the safety, tranquillity, and embellishment of the city. The keys of the famous bank of this city are in the hands of these magistrates.

The college consists of new burgomasters or echevins, who are judges in all criminal affairs, without appeal; but in civil causes they may appeal to the council of the province. There are two treasurers, a bailiff, and a pensionary. The bailiff continues in his office three years; and searches after criminals, takes care to prosecute them, and sees their sentence executed. The pensionary is the minister of the magistracy, is well versed in the laws, makes public harangues, and is the defender of the interests of the city. The city of Amsterdam contributes to the public income above 50,000 livres per day, besides the excise of beer, flesh, and corn; which in all amounts to above 1,600,000 l. a-year. This is more than is paid by all the rest of the provinces put together; and yet Amsterdam bears but the fifth rank in the assembly of the states of Holland, with this distinction, that whereas other cities send two members, this sends four.

The militia of Amsterdam is very considerable. They have 60 companies, each of which has from 200 to 300 men. Jews and Anabaptists are excluded from this service, not being admitted to bear arms: But they are obliged to contribute to the maintenance of the city-guard, which consists of 1400 soldiers; as also to the night-watch, who patrol about the streets, and proclaim the hour. Besides these, there are trumpeters on every church steeple, who sound every half hour; and if there happens a fire, they ring the fire-bell, and show where it is. The inhabitants have excellent contrivances to extinguish it speedily.

The trade of Amsterdam is prodigious: for almost the whole trade of the East India Company centres in this city, which besides carries on a commerce with all the rest of the world, insomuch that it may be called the magazine or store-house of Europe. They import a vast deal of corn from the Baltic, not so much for present consumption, as to lay up against times of scarcity. The richest spices are entirely in the hands of the East India Company, who furnish all Europe therewith. They have vast quantities of military stores, with which they supply several nations; which is owing to their engrossing most of the iron-works on the Rhine and other great rivers that run into Holland. The longitude of Amsterdam is 4. 30. E.; the latitude, 52. 25. N.

AMSTERDAM, is also the name of an island in the south-sea, said to have been discovered by Tasman a Dutch navigator. It was visited by Captain Cook in his late voyages. Its greatest extent from east to west is about 21 miles, and from north to south about 13.

It is broad at the east end, and runs taper towards the west, where it turns, and runs to a point due north. It is about six leagues to the west of Middleburgh. The shore is surrounded by a coral rock, and its most elevated parts are not above six or eight yards above the level of the sea. S. Lat. 21. 11. W. Long. 175. It is wholly laid out in plantations, in which are cultivated some of the richest productions of nature.

Here are bread-fruit, cocoa-nut trees, plantains, bananas, shaddock, yams and some other roots, sugar-canes, and a fruit like a nectarine called by the natives *fighega*. There did not appear an inch of waste ground: the roads occupied no more space than was absolutely necessary: the fences did not take up above four inches each: and even these were not wholly lost, for in many grew some useful trees or plants: it was every where the same, change of place altered not the scene: nature, assisted by a little art, nowhere appeared with more splendor than on this island. Water is not so plentiful here as at the Society-islands; but the chief pointed out a pool of fresh water unasked, to supply the ships with that necessary article. Casuarinas, pandangs, and wild fago-palms, appear here with their various tints of green, and barringtonia as big as the loftiest oaks. The bread-fruit does not, however, thrive here with the same luxuriance as at the Society-islands; the coral rock, which composes the basis of this spot, being much more thinly covered with mould.

Both men and women are of the common size of Europeans, and their colour is that of a lightish copper; they are well-shaped, have regular features, are active, brisk, and lively. They have fine eyes, and in general good teeth, even to an advanced age. The women are the merriest creatures imaginable, and incessant talkers. In general, they appear to be modest; although there was no want of those of a different stamp. Among the natives, who swam about the ship very vociferously, were a considerable number of women, who wantoned in the water like amphibious creatures, and were easily persuaded to come on board perfectly naked; but none of them ventured to stay there after sunset, but returned to the shore to pass the night, like the greater part of the inhabitants, under the shade of the wild wood which lined the coast. There they lighted great fires, and were heard conversing almost the whole night. The hair of both sexes in general is black, but especially that of the women; both sexes wear it short, except a single lock on the top of the head, and a small quantity on each side. The men cut or shave their beards quite close, which operation they perform with two shells. The hair of many was observed to be burnt at the ends, and strewed with a white powder, which was found, on examining it, to be lime made of shell or coral, which had corroded or burnt the hair; some made use of a blue powder, and others, both men and women, of an orange-coloured powder made of turmeric.

The dress of both sexes consists of a piece of cloth or matting wrapped round the waist, and hanging down below the knees. From the waist upwards they are generally naked, and it seems to be a custom to anoint these parts every morning. The practice of tattowing, or puncturing the skin, likewise prevails. The men are tattowed from the middle of the thigh to above

Amsterdam
Amulet.

above the hips; the women have it only on their arms and fingers, and on those parts but very slightly. Their ornaments are amulets, necklaces, and bracelets, the bone, shells, and beads of mother-of-pearl, tortoise-shell, &c. which are worn by men as well as women. The women also wear on their fingers neat rings made of tortoise-shell, and pieces in their ears about the size of a small quill: but here ornaments are not commonly worn, though all have their ears pierced. They have also a curious apron, made of the cocoa-nut shell, and composed of a number of small pieces sewed together in such a manner as to form stars, half-moons, little squares, &c.; it is studded with beads and shells, and covered with red feathers, so as to have a pleasing effect. They make the same kind of cloth, and of the same materials, as at O-Taheitee, though they have not such a variety, nor do they make any so fine; but as they have a method of glazing it, it is more durable, and will resist rain for some time, which the other cloth would not. Their colours are black, brown, yellow, purple, and red; all made from vegetables. They make various sorts of matting, some of a very fine texture, which is generally used for cloathing; and the thick and stronger sort serves to sleep upon, and to make sails for their canoes, &c. Among other useful utensils, they have various sorts of baskets, some made of the same materials as their mats, and others of the twisted fibres of cocoa-nuts. These are not only durable, but beautiful, being generally composed of different colours, and studded with beads made of shells or bones. They have many little nicknacks among them, which show that they neither want taste to design, nor skill to execute, whatever they take in hand. Their fishing implements are much the same as in other islands: here was purchased a fish-net made like our casting-nets, knit of very firm though slender threads.

Notwithstanding their very friendly disposition, these people have very formidable weapons: some of their spears have many barbs, and must be very dangerous weapons when they take effect. A large flat shell or breastplate was purchased, made of a roundish bone, white and polished like ivory, about 18 inches in diameter, which appeared to have belonged to an animal of the whale tribe.

AMULET, a charm, or preservative against mischief, witchcraft, or diseases.

Amulets were made of stone, metal, simples, animals, and in a word of every thing that imagination suggested.

Sometimes they consisted of words, characters, and sentences, ranged in a particular order, and engraved upon wood, &c. and worn about the neck, or some other part of the body. See ABRACADABRA.

At other times they were neither written nor engraved; but prepared with many superstitious ceremonies, great regard being usually paid to the influence of the stars. The Arabians have given to this species of amulet the name of TALISMAN.

All nations have been fond of amulets: the Jews were extremely superstitious in the use of them, to drive away diseases; and the Misna forbids them, unless received from an approved man who had cured at least three persons before by the same means.

Among the Christians of the early times, amulets

were made of the wood of the cross, or ribbands with a text of scripture written in them, as preservatives against diseases. Notwithstanding the progress of learning and refinement, there is not any country in Europe, even at this day, who do not believe in some charm or other. The pope is supposed to have the virtue of making amulets, which he exercises in the consecrating of *Agnus Dei's*, &c. The sponge which has wiped his table, was formerly in great veneration as a preservative from wounds, and from death itself: on this account it was sent with great solemnity by Gregory II. to the duke of Aquitain.

Amulets are now much fallen from the repute they were anciently in; yet the great Mr Boyle alleges them as an instance of the increase of external effluvia into the habit, in order to show the great porosity of the human body. He adds, that he is persuaded some of these external medicines do answer; for that he himself, having once been subject to bleed at the nose, and reduced to use several remedies to check it, found the moss of a dead man's skull, though only applied so as to touch the skin till the moss was warm thereby, the most effectual of any. The same Mr Boyle shows how the effluvia, even of cold amulets, may, in tract of time, pervade the pores of a living animal; by supposing an agreement between the pores of the skin and the figure of the corpuscles. Bellini has demonstrated the possibility of the thing in his last propositions *De Febris*; and the like is done by Dr Wainwright, Dr Keill, &c.

AMURAT, or AMURATH, I. the fourth emperor of the Turks, and one of the greatest princes of the Ottoman empire, succeeded Solyman in 1360. He took from the Greeks Gallipoli, Thrace, and Adrianople, which last he chose for the place of his residence. He defeated the prince of Bulgaria, conquered Misnia, chastised his rebellious bashaws, and is said to have gained 36 battles. This prince, in order to form a body of devoted troops that might serve as the immediate guards of his person and dignity, appointed his officers to seize annually, as the imperial property, the fifth part of the Christian youth taken in war. These, after being instructed in the Mahometan religion, inured to obedience by severe discipline, and trained to warlike exercises, were formed into a body distinguished by the name of *Janissaries*, or *New Soldiers*. Every sentiment which enthusiasm can inspire, every mark of distinction that the favour of the prince could confer, were employed in order to animate this body with martial ardour, and with a consciousness of its own pre-eminence. The Janissaries soon became the chief strength and pride of the Ottoman armies, and were distinguished above all the troops whose duty it was to attend on the person of the Sultan.—At length the death of Lazarus, despot of Servia, who had endeavoured in vain to stop the progress of Amurath's arms, touched Milo, one of his servants, in so sensible a manner, that, in revenge, he stabbed the sultan in the midst of his troops, and killed him upon the spot, A. D. 1389, after he had reigned 23 years.

AMURAT II. the 10th emperor of the Turks, was the eldest son of Mahomet I. and succeeded his father in 1421. He besieged Constantinople and Belgrade without success; but he took Thessalonica from the Venetians, and compelled the prince of Bosnia and

Amyclæ, and John Castriot prince of Albany to pay him tribute. He obliged the latter to send his three sons as hostages; among whom was George, celebrated in history by the name of *Scanderbeg*. John Hanniades defeated Amurat's troops, and obliged him to make peace with the Christian princes, in 1442. These princes afterwards breaking the peace, Amurat defeated them in the famous battle of Varna, November 10th, 1444, which proved so fatal to the Christians, and in which Ladislaus king of Hungary was killed. He afterwards defeated Hunniades, and killed above 20,000 of his men; but George Castriot, better known by the name of *Scanderbeg*, being re-established in the estates of his father, defeated the Turks several times, and obliged Amurat to raise the siege of Croia, the capital of Albany. Amurat died, chagrined with his ill success, and infirm with age, February 11th, 1451, at Adrianople. It is observed to this prince's honour, that he always kept his treaties with the greatest fidelity.

AMYCLÆ, a city of Laconia, distant about 18 miles from the metropolis, founded by Amyclas the son of Lacedæmon, and famed afterwards for the birth of Castor and Pollux the sons of Tydareus, eighth king of Sparta. It was afterwards famed for sending a considerable colony of its own inhabitants into Upper Calabria, who built there a city which they called by the same name. This last city was situated between Caieta and Terracina, and gave its name to the neighbouring sea. According to Pliny and Solinus, the territory of Amyclæ was so infested with vipers and other serpents, that the inhabitants were obliged to abandon their dwellings and settle elsewhere.—Among the ancient poets, the Amycli, or inhabitants of this city, obtained the epithet of *taciti* or *silent*. The reason of this was, either because it was built by the Lacedæmonians, who, as they followed the doctrine of Pythagoras, were always inculcating the precept of silence, and thence called *taciti*: or because of a law which obtained in this place, forbidding any one, under severe penalties, to mention the approach of an enemy. Before this law was made the city was daily alarmed by false reports, as the enemy had been already at the gates. From terrors of this kind the abovementioned law indeed delivered them; but in the end it proved the ruin of the city: For the Dorians appearing unexpectedly under the walls, no one ventured to transgress the law: so that the city was easily taken. They reduced it to an inconsiderable hamlet; in which, however, were seen some of the remains of its ancient grandeur. One of the finest buildings that escaped the common ruin, was the temple and statue of Alexandra, whom the inhabitants pretended to be the same with Cassandra the daughter of Priam.

AMYGDALUS, the **ALMOND** and **PEACH**: a genus of the monogynia order, belonging to the icosan-dria class of plants; and, in the natural method, ranking under the 36th order, *Pomaceæ*. The characters are: the *calyx* is a single-leaved perianthium beneath, tubular, and quinquefid: The *corolla* consists of five oblong petals, which are inserted into the calyx: The *stamina* consists of 30 slender erect filaments half the length of the corolla, and inserted into the calyx; the antheræ are simple: The *pistillum* has a round villous germen above; a simple stylus, the length of the stamina; and the stigma headed: The *pericarpium* is a

large roundish villous drupa, with a longitudinal furrow: The *seed* is an ovate compressed nut perforated in the pores.

Species. 1. The *Communis*, or Common Almond, a native of Africa, will grow to near 20 feet high; and whether planted singly in an open place, or mixed with others in clumps, shrubbery-quarters, &c. shows itself one of the finest flowering trees in nature. Those who never yet saw it, may easily conceive what a noble appearance this tree must make, when covered all over with a bloom of a delicate red, which will be in March; a time when very few trees are ornamented either with leaves or flowers. No ornamental plantation, therefore, of what sort or kind soever, should be without almond-trees. Neither are the beauties of the flowers the only thing desirable in this tree: The fruit would render it worthy of planting, were there no other motive. It ripens well, and its goodness is not unknown to us.—The white-flowering almond, well known in our nurseries, is a variety of this species, and is cultivated for the sake of the flowers and the fruit, though the flowers are inferior to the others; and unless it be set against a south wall, in a well sheltered place, there will be little hopes of bearing fruit.

2. The *Nana*, Dwarf Almond, is a native of Asia Minor. Of this shrub there are two sorts, the single and the double. Both grow to about four or five feet high, and are in the first esteem as flowering shrubs. The single sort has its beauties; but the double kind is matchless. In both the flowers are arranged the whole length of the last year's shoots; their colour is a delicate red; and they show themselves early in the spring, which still enhances their value.

3. The *Persica*, or Peach, is said to be a native of Europe; but of what place is not known. Cultivation has produced many varieties of this fruit; of which the following are the most esteemed.

- | | |
|-----------------------------|-------------------------|
| 1. The White Nutmeg. | 15. The Bellegarde. |
| 2. The Red Nutmeg. | 16. The Bourdine. |
| 3. The Early Purple. | 17. The Rossanna. |
| 4. The Small Mignon. | 18. The Admirable. |
| 5. The White Magdalen. | 19. The Old Newington. |
| 6. The Yellow Aiberge. | 20. The Royal. |
| 7. The Large French Mignon. | 21. The Rambouillet. |
| 8. The Beautiful Chevreuse. | 22. The Portugal. |
| 9. The Red Magdalen. | 23. The Late Admirable. |
| 10. The Chancellor. | 24. The Nivette. |
| 11. Smith's Newington. | 25. Venus's Nipple. |
| 12. The Montauban. | 26. The Late Purple. |
| 13. The Malta. | 27. The Persique. |
| 14. The Vineuse. | 28. The Catharine. |
| | 29. The Monstrous Pavy. |
| | 30. The Bloody Peach. |

The White Nutmeg is the first peach in season, it being often in perfection by the end of July. The leaves are doubly serrated, the flower large, and of a pale colour; the fruit is white, small, and round; the flesh too is white, parts from the stone, and has a sugary, musky flavour.

The Red Nutmeg hath yellowish green leaves, with serpentine edges, which are slightly serrated. The flowers are large, open, and of a deep blush-colour. The fruit is larger and rounder than the former, and is of a bright vermilion next the sun, but more yellow on the other side. The flesh is white, except next the stone,

Amygdalus.

Amygda-
lus.

stone, from which it separates, and has a rich musky flavour. It ripens just after the white nutmeg.

The Early Purple hath smooth leaves, terminated in a sharp point. The flowers are large, open, and of a lively red. The fruit is large, round, and covered with a fine deep red coloured down. The flesh is white, red next the stone, and full of a rich vinous juice. Ripe about the middle of August.

The Small Mignon hath leaves slightly serrated, and the flowers small and contracted. The peach is round, of a middling size, tinged with darkish red on the sunny side, and is of a pale yellowish colour on the other. The flesh is white, parts from the stone, where it is red, and contains plenty of a vinous, sugary juice. Ripens rather before the former.

The White Magdalen hath long, shining, pale green leaves, deeply serrated on the edges, and the wood is mostly black at the pith. The flowers are large and open, appear early, and are of a pale red. The fruit is round, rather large, of a yellowish-white colour, except on the sunny side, where it is slightly streaked with red. The flesh is white to the stone, from which it separates, and the juice is pretty well flavoured. Ripe at the end of August.

The Yellow Alberge hath deep red, middle-sized flowers: the peach is smaller than the former, of a yellow colour on the shady side, and of a deep red on the other. The flesh is yellow, red at the stone, and the juice is sugary and vinous.

The Great French Mignon hath large, finely serrated leaves, and beautiful red flowers. The fruit is large, quite round, covered with a fine fattiny down, of a brownish red colour on the sunny side, and of a greenish yellow on the other. The flesh is white, easily parts from the skin, and is copiously stored with a sugary high-flavoured juice. Ripe near the middle of August.

The Beautiful Chevreuse hath plain leaves, and small contracted flowers. The fruit is rather oblong, of a middling size, of a fine red colour next the sun, but yellow on the other side. The flesh is yellowish, parts from the stone, and is full of a rich sugary juice. It ripens a little after the former.

The Red Magdalen hath deeply serrated leaves, and large open flowers. The fruit is large, round, and of a fine red next the sun. The flesh is firm, white, separates from the stone, where it is very red; the juice is sugary, and of an exquisite rich flavour. Ripe at the end of August.

The Chancellor hath large, slightly serrated leaves. The peach is about the size of the Beautiful Chevreuse, but rather rounder. The skin is very thin, of a fine red on the sunny side; the flesh is white and melting, parts from the stone, and the juice is very rich and sugary. It ripens with the former.

The leaves of Smith's Newington are serrated, and the flowers are large and open. The fruit is of a middle size, of a fine red on the sunny side; the flesh white and firm, but very red at the stone, to which it sticks closely, and the juice has a pretty good flavour. Ripens with the former.

The Montauban hath serrated leaves, and large open flowers. The fruit is about the size of the former, of a purplish red next the sun, but of a pale one on the shady side. The flesh is melting, and white even to

N^o 16.

the stone, from which it separates. The juice is rich, and well flavoured. It ripens a little before the former.

Amygda-
lus.

The Malta hath deeply serrated leaves, and the flowers are large and open. The fruit is almost round, of a fine red next the sun, marbled with a deeper red, but the shady side is of a deep green. The flesh is fine, white, except at the stone, from which it parts, where it is of a deep red; the juice is a little musky, and agreeable. It ripens at the end of August, or beginning of September.

The Vineuse hath large deep green leaves, and full bright red flowers. The fruit is round, of a middle size; the skin is thin, all over red; the flesh fine and white, except at the stone, where it is very red, and the juice is copious and vinous. Ripe in the middle of September.

The Bellegarde hath smooth leaves, and small contracted flowers. The fruit is very large, round, and of a deep purple colour next the sun. The flesh is white, parts from the stone, where it is of a deep red, and the juice is rich and excellent. It ripens early in September.

The Bourdine hath large, fine green, plain leaves, and small flesh coloured contracted flowers. The fruit is round, of a dark red next the sun; the flesh white, except at the stone, where it is of a deep red, and the juice is rich and vinous. Ripens with the former.

The Rossanna hath plain leaves, and small contracted flowers. The fruit is rather longer than the alberge, and some count it only a variety of the latter. The flesh is yellow, and parts from the stone, where it is red; the juice is rich and vinous. Ripe early in September.

The Admirable hath plain leaves, and small contracted flowers, which are of a pale red. The fruit is very large and round; the flesh is firm, melting, and white, parts from the stone, and is there red; and the juice has a sweet, sugary, high vinous flavour. Ripe early in September.

The Old Newington hath serrated leaves, and large open flowers. The fruit is large, of a fine red next the sun; the flesh is white, sticks close to the stone, where it is of a deep red, and the juice has an excellent flavour. It ripens just after the former.

The Royal hath plain leaves, and small contracted flowers. The fruit is about the size of the admirable, and resembles it, except that it has sometimes a few knobs or warts. The flesh is white, melting, and full of a rich juice; it parts from the stone, and is there of a deep red. Ripe about the middle of September.

The Rambouillet hath leaves and flowers like the royal. The fruit is rather round than long, of a middling size, and deeply divided by a furrow. It is of a bright yellow on the shady side, but of a fine red on the other. The flesh is melting, yellow, parts from the stone, where it is of a deep red, and the juice is rich and vinous. Ripe with the former.

The Portugal hath plain leaves, and large open flowers. The fruit is large, spotted, and of a beautiful red on the sunny side. The flesh is firm, white, sticks to the stone, and is there red. The stone is small, deeply furrowed, and the juice is rich and sugary. Ripe towards the end of September.

The Late Admirable hath serrated leaves, and brownish

ish

Amygdalus. *ish red small contracted flowers.* The fruit is rather large and round, of a bright red next the sun, marbled with a deeper. The flesh is of a greenish-white, and sticks to the stone, where it hath several red veins; the juice is rich and vinous. Ripe about the middle of September.

The Nivette hath serrated leaves, and small contracted flowers. The fruit is large and roundish, of a bright red colour next the sun, but of a pale yellow on the shady-side. The flesh is of a greenish-yellow, parts from the stone, where it is very red, and is copiously stored with a rich juice. It ripens about the middle of September.

Venus's Nipple hath finely serrated leaves, and rose-coloured, small contracted flowers, edged with carmine. The fruit is of a middling size, and has a rising like a breast. It is of a faint red on the sun-side, and on the shady one of a straw-colour. The flesh is melting, white, separates from the stone, where it is red, and the juice is rich and sugary. Ripens late in September.

The Late Purple hath large, serrated leaves, which are variously contorted, and the flowers are small and contracted. The fruit is round, large, of a dark red on the sunny side, and yellowish on the other. The flesh is melting, white, parts from the stone, where it is red, and the juice is sweet and high-flavoured. Ripens with the former.

The Perisque hath large, very long indented leaves, and small contracted flowers. The fruit is large, oblong, of a fine red next the sun; the flesh firm, white, but red at the stone, juicy, and of a high pleasant flavour. The stalk has frequently a small knot upon it. Ripe late in September.

The Catharine hath plain leaves, and small flowers. The fruit is large, round, of a very dark red next the sun. The flesh white, firm, sticks close to the stone, and is there of a deep red. The juice is rich and pleasant. It ripens early in October.

The Montrous Pavy hath large, very slightly serrated leaves, and large, but rather contracted flowers. The fruit is round, and very large, whence its name. It is of a fine red on the sunny side, and of a greenish-white on the other. The flesh is white, melting, sticks close to the stone, and is there of a deep red. It is pretty full of juice, which in dry seasons is sugary, vinous, and agreeable. Ripe towards the end of October.

The Bloody Peach hath rather large, serrated leaves, which turn red in autumn. The fruit is of a middling size, the skin all over of a dull red, and the flesh is red down to the stone. The fruit is but dry, and the juice rather sharp and bitterish. It seldom ripens well in England, but is well worth cultivating notwithstanding, for the fruit bake and preserve excellent well.

The peach-tree has hitherto been planted against walls for the sake of the fruit: "but (says Hanbury), as I hardly ever knew a person who was not struck with the beauty of the flowers when in full blow against a wall, why should it not have a share in wilderness-quarters and shrubberies, amongst the sorts of almonds, &c? It may be kept down, or permitted to grow to the height of the owner's fancy; and the flowers are inferior to none of the other sorts. Add to this, they frequently, in well-sheltered places, produce fruit which will be exceeding well-flowered; and thus the owner may enjoy the benefit of a double treat." The above

VOL. I. Part II.

observations respect the single peach; with regard to the double-flowered, it is generally propagated for ornamental plantations, and is universally acknowledged to be one of the finest flowering trees yet known. Against a wall, however, these trees are always the fairest; and if they have this advantage, they are succeeded by very good fruit.

The NECTARINE, according to Linnæus, is only a variety of the peach; its having a smooth coat being only an accident originally. Of this also many varieties are now cultivated; and the following are some of the most esteemed: 1. The Elruge. 2. The Newington. 3. The Scarlet. 4. The Roman. 5. The Murrey. 6. The Italian. 7. The Golden. 8. The Temple's.

The Elruge hath large serrated leaves, and small flowers. The fruit is of a middling size, of a dark purple colour next the sun, and of a greenish yellow on the shady side. The flesh parts from the stone, and has a soft, melting, good flavoured juice. Ripe early in August.

The Newington hath serrated leaves, and large open flowers. The fruit is pretty large, of a beautiful red on the sunny side, but of a bright yellow on the other. The flesh sticks to the stone, is there of a deep red colour, and the juice has an excellent rich flavour. Ripe towards the end of August.

The Scarlet is rather less than the former, of a fine scarlet colour next the sun, but fades to a pale red on the shady side. It ripens near the time of the former.

The Roman, or cluster red nectarine, hath plain leaves, and large flowers. The fruit is large, of a deep red towards the sun, but yellowish on the shady side. The flesh is firm, sticks to the stone, and is there red; the juice is rich, and has an excellent flavour. Ripe about the end of August.

The Murrey is a middling-sized fruit, of a dirty red colour on the sunny side, and yellowish on the shady one. The flesh is firm, and tolerably well flavoured. It ripens early in September.

The Italian Nectarine hath smooth leaves and small flowers; the fruit is red next the sun, but yellowish on the other side; flesh firm, adheres to the stone, where it is red, and when ripe, which is early in September, has an excellent flavour.

The Golden Nectarine has an agreeable red colour next the sun, bright yellow on the opposite side; flesh very yellow, sticks to the stone, where it is of a pale red, has a rich flavour, and ripens in September.

Temple's Nectarine is of a middling size, of a fair red next the sun, of a yellowish green on the other side; flesh white near the stone, from which it separates; ripens in September, and has a high poignant flavour.

Propagation, &c. All the above species are propagated by inoculating them into plum-stocks in August. The stocks should be first planted in the nursery when of the size of a straw; and the first or second summer after they will be ready to receive the bud. The usual method of inoculation must be observed, and there is no danger of success; though it may be proper to observe, that the double-blossomed peach should always be worked into the stocks of the muskel-plum. The two sorts of dwarf almond may also be propagated by layers, or from the suckers, which they sometimes send forth in great plenty.

Amygda-
lus.

The varieties of the peach are produced like those of the finer flowers, by sowing the seeds; and though many raised this way will be of little value, as is also the case of flowers, yet probably among a parcel of stones, saved from the finer kinds of peaches, there would be some new kinds produced; which, as they were raised here, would be easily kept up in their perfection, which is not to be expected of those brought from other countries. The best method of saving the stones is, to let some of the finest peaches of the best kinds hang till they drop of themselves from the tree, and then the stones should be immediately planted on a bed of light dry earth, planting them about three inches deep in the earth, and at about four inches asunder. The beds should be covered to preserve them in the winter; and in spring, when the plants come up, they must be cleared of weeds, and well watered. The next spring they should be carefully taken up, and planted in the nursery, in rows three feet asunder, and one foot distant from each other; laying a little mulch upon the surface of the ground about their roots, and in a dry spring watering them once in a week; and after one or two years standing here, they may be removed to the places where they are to remain; or they may at that time, when the condition of their fruit is known, be grafted on other stocks.

There are two general rules given for the pruning of peach and nectarine trees; viz. 1. Always to have enough of bearing wood; And, 2. Not to lay in the branches too close to one another. All peach trees produce their fruit from the young wood either of the same, or at the most of the former year's shoot; for which reason the branches are to be so pruned, as to encourage them to throw out new shoots in every part of the tree: and this is to be done in May; when by pinching, or stopping the strong shoots, there may be new wood forced out in any part of the tree. This is the method of the summer pruning: the winter pruning is usually done in February or March; but is much better done at Michaelmas, as soon as their leaves begin to fall; and the wounds will then have time to heal before the severe frosts come on.

In pruning of these trees it must always be observed also, that it is best done under a wood bud, not a blossom bud; which may be distinguished by the wood bud's being less turgid, and longer and narrower than the blossom bud; for if the shoot have not a leading bud where it is cut, it will commonly die down to the leading bud. In nailing the shoots to the wall, they should be placed at as equal distances as possible; and so far apart that the leaves may have room; and they must always be trained as horizontally as possible, that the lower part of the tree may be well wooded, which it will not be if the branches are suffered to run upright. When the fruit is set and grown to the size of a small nut, it should be thinned, and left five or six inches asunder: by this management the fruit will be larger and better tasted, and the trees in a condition to bear well the succeeding year. The quantity of fruit to be left on large full grown trees should never be greater than five dozen upon each; but on middling trees, three or four dozen will be enough. If the season should prove hot and dry, it will be proper to draw up the earth round the stem of each tree, to form a

hollow basin of about six feet in diameter, and cover the surface of the ground in this basin with mulch; and once in a week or fortnight, according to the draught of the season, to pour down eight or ten gallons of water to the root of each tree; or the water may be sprinkled by an engine over the branches of the trees, which, shaking down to the roots, will promote the growth of the fruit and prevent its falling off the trees. This, however, should be continued only while the fruit is growing.

The peach-tree, as well as the rose-tree, are very subject to be over-run with the aphides; which may be destroyed by fumigating the house in which the plants are kept with tobacco, or, which is said to be the most effectual method, by steam raised from water poured over the flues. — Soap-suds are said to destroy effectually the different species of insects that infest fruit-trees growing against walls, and particularly the peach, cherry, and plum. For this purpose, a person on a ladder should pour them from a watering-pot over both trees and wall, beginning at the top of the wall, and bringing it on in courses from top to bottom. The suds contribute likewise, it is said, to preserve the wood of the delicate and tender kinds of peaches.

Uses. Sweet almonds are reckoned to afford little nourishment; and, when eaten in substance, are not easy of digestion, unless thoroughly comminuted: Peeled, and eaten six or eight at a time, they sometimes give present relief in the heart-burn. But in medicine they are mostly used for making emulsions; and they abound not only with an oil, but likewise with a mucilage fit for incorporating oil and water together.

Emulsions are commonly prepared from almonds, by beating an ounce of them, after being blanched, into a fine pulp, in a marble or stone mortar; and triturating them well with half an ounce (more or less) of fine sugar; and then adding by little at a time, a quart of water; taking care to continue grinding them while the water is poured on; after which the white milky liquor is strained through a cloth, and put into a quart bottle. Some people add a dram of blanched bitter almonds to an ounce of the sweet, which they think make the emulsions more agreeable. Such emulsions have been much used as drink in acute diseases, for diluting and blunting acrimonious juices in the first passages, and acrid saline particles in the blood; and for softening and lubricating the fibres and membranes.

It has been a common practice to dissolve from half an ounce to an ounce, or more, of gum arabic in the water used for making the emulsions; and to make patients drink freely of them, while blisters are applied to the body, in order to prevent strangury; and to order them to be used in cases of gravel, and of inflammation of the bladder or urethra; and in heat of urine from virulent gonorrhœa or other causes.

Camphor, resin of jalap, and other resinous substances, by being triturated with almonds, become miscible with water, and more mild and pleasant than they were before; and therefore they are frequently ordered to be rubbed with them, and made up into pills or boluses, with the addition of some conserve or gum arabic mucilage; or they are incorporated with watery liquors into the form of an emulsion.

Formerly

See *Kyza*
on Forcing
Peaches,
&c.

Amygdalus,
Amyot.

Formerly the seeds of the lettuce, of the cucumber, of the white poppy, and of a number of other plants, were employed for making emulsions; but now in this country the sweet almonds supply the place of all the rest.

The bitter almonds are not so much used as they were formerly; because they have been found to destroy some sorts of animals: this effect was related by the ancients, but believed to be fictitious; because when eaten by men they appear to be innocent, and to produce no deleterious effects. However, the facts related by Wepfer in his *Treatise de Cicuta Aquatica*, having been confirmed by later experiments: and it having been discovered that a water drawn from them had deleterious effects, and that the distilled water from the lauro-cerasus leaves, which have a bitter taste resembling that of bitter almonds, was still more poisonous; it raised a suspicion of the wholesomeness of those bitter substances, and has made physicians more cautious of using them, though they have been employed for making orgeate and other liquors, without producing any bad effects.

As to the peach and nectarine, they are sufficiently known as delicious fruits. Peach-flowers have an agreeable smell, and a bitterish taste; distilled, without any addition, by the heat of a water-bath, they yield one sixth their weight, or more, of a whitish liquor, which, as Mr Bolduc observes, communicates to a large quantity of other liquids a flavour like that of the kernels of fruits. An infusion in water of half an ounce of the fresh-gathered flowers, or a dram of them when dried, sweetened with sugar, proves for children an useful laxative and anthelmintic: the leaves of the tree are, with this intention, somewhat more efficacious, though less agreeable. The fruit has the same quality with the other sweet fruits, that of abating heat, quenching thirst, and gently loosening the belly.

AMYLACEOUS, from *amylum* "starch;" a term applied to the fine flour of farinaceous seeds, in which consists their nutritive part. See BREAD.

AMYNIA, in literary history, a beautiful pastoral comedy, composed by Tasso; the model of all dramatic pieces wherein shepherds are actors. The *Pastor Fido*, and *Filii di Sciro*, are only copies of this excellent piece.

AMYNTOR, ἀμυντωρ formed of the verb ἀμυνω, *I defend*, or *avenge*, properly denotes a person who defends or vindicates a cause. In this sense, Mr Toland intitles his defence of Milton's life, *Amyntor*, as being a vindication of that work against Mr Blackhall and others, who had charged him with questioning the authority of some of the books of the New Testament, and declaring his doubt that several pieces under the name of Christ and his apostles, received now by the whole Christian church, were supposititious.

AMYOT (James), bishop of Auxerre and great almoner of France, was born of an obscure family at Melun, the 30th of October 1514, and studied philosophy at Paris, in the college of Cardinal Le Moine. He was naturally dull and heavy; but diligence and application made amends for these natural defects. He left Paris at the age of twenty-three; and went to Bourges with the Sieur Colin, who had the abbey of St Ambrose in that city. At the recommendation of this abbot, a secretary of state took Amyot into his house

to be tutor to his children. The great improvements they made under his direction induced the secretary to recommend him to the princess Margaret duchess of Berry, only sister of Francis I. and by means of this recommendation Amyot was made public professor of Greek and Latin in the university of Bourges. It was during this time he translated into French the "Amours of Theagines and Chariclea," which Francis I. was so pleased with, that he conferred upon him the abbey of Bellosane. He also translated Plutarch's Lives, which he dedicated to the king; and afterwards undertook that of Plutarch's Morals, which he ended in the reign of Charles IX. and dedicated to that prince. Charles conferred upon him the abbey of St Cornelius de Compiègne, and made him great almoner of France and bishop of Auxerre. He died in 1593, aged 79.

AMYRALDISM, a name given by some writers to the doctrine of universal grace, as explained and asserted by Amyraldus, or Moses Amyrault, and others his followers, among the reformed in France, towards the middle of the 17th century.

This doctrine principally consisted of the following particulars, viz. that God *desires* the happiness of all men, and none are excluded by a divine decree; that none can obtain salvation without faith in Christ; that God refuses to none the *power* of *believing*, though he does not grant to *all* his assistance, that they may improve this power to saving purposes; and that many perish through their own fault. Those who embraced this doctrine were called *Universalists*; though it is evident they rendered grace *universal* in words, but *partial* in reality, and are chargeable with greater inconsistencies than the *Supralapsarians*.

AMYRAULT (Moses), an eminent French Protestant divine, born at Bourgueil in Touraine in 1596. He studied at Saumur, where he was chosen professor of *theology*; and his learned works gained him the esteem of Catholics as well as Protestants, particularly of Cardinal Richelieu, who consulted him on a plan of reuniting their churches, which however, as may well be supposed, came to nothing. He published a piece in which he attempted to explain the mystery of predestination and grace, which occasioned a controversy between him and some other divines. He also wrote, An Apology for the Protestants; a Paraphrase on the New Testament; and several other books. This eminent divine died in 1664.

AMYRIS: A genus of the monogynia order, belonging to the decandria class of plants. The characters are: The *calyx* is a small single-leaved perianthium, four toothed and persistent: The *corolla* consists of four oblong petals, concave and expanding: The *stamina* consist of eight erect subulated filaments; the anthers are oblong, erect, and the length of the corolla: The *pistillum* has an ovate germen, above; a thickish stylus, the length of the stamina; and a four-cornered stigma: The *pericarpium* is a round drupaceous berry: The *seed* is a globular glossy nut.—The most remarkable species are: 1. The elemifera, or shrub which bears the gum elemi, a native of South America. It grows to the height of about six feet, producing trifoliated stiff shining leaves, growing opposite to one another on footstalks two inches long. At the ends of the branches grow four or five slender stalks set with many

Amyraldis,
Amyris.

Amyris. very small white flowers. 2. The *gileadenfis*, or *opobalsamum*, is an evergreen shrub, growing spontaneously in Arabia Felix, from whence the *opobalsam*, or balm of gilead, is procured. 3. *Toxifera*, or poison wood, is a small tree, with a smooth light-coloured bark. Its leaves are winged; the middle rib is seven or eight inches long, with pairs of pinnæ one against another on inch-long footstalks. The fruit hangs in bunches, is shaped like a pear, and is of a purple colour, covering an oblong hard stone. From the trunk of this tree distils a liquid as black as ink. Birds feed on the fruit; particularly one, called the *purple grosbeak*, on the mucilage that covers the stone. It grows usually on rocks, in Providence, Ilathera, and others of the Bahama islands. 4. The *balsamifera*, or rose-wood, is found on gravelly hills in Jamaica and others of the West India islands. It rises to a considerable height, and the trunks are remarkable for having large protuberances on them. The leaves are laurel-shaped; the small blue flowers are on a branched spike; and the berries are small and black.

Properties. From the first species, which is called by the natives of the Brasils *icicariba*, is obtained the resin improperly called *gum elemi*, or gum lemon. This drug is brought to us from the Spanish West Indies, and sometimes from the East Indies, in long roundish cakes, generally wrapped up in flag leaves. The best sort is softish, somewhat transparent, of a pale whitish yellow colour, inclining a little to green, of a strong not unpleasant smell. It almost totally dissolves in pure spirit, and sends over some part of its fragrance along with this menstruum in distillation: distilled with water, it yields a considerable quantity of pale coloured, thin, fragrant essential oil. This resin gives name to one of the officinal unguents, and is at present scarce any otherwise made use of; though it is certainly preferable, for internal purposes, to some others which are held in greater esteem. The second species yields the balsam of Mecca, of Syria, or of Gilead, which is the most fragrant and pleasant of any of the balsams. The true balsam tree is found near to Mecca, which is situated about a day's journey from the Red Sea, on the Asiatic side. It has a yellowish or greenish yellow colour, a warm bitterish aromatic taste, and an acidulous fragrant smell. It has long been held in great esteem. The Turks, who are in possession of the country in which it grows, value it much as an odoriferous unguent and cosmetic, and set such a high price upon it, that it is adulterated when it comes into the hands of the dealers, so that it is very difficult to get genuine specimens of it, and therefore it is very seldom used in this country: it has been recommended in great variety of complaints; but now it is generally believed that the Canada and copiava balsams are equally efficacious, and will answer every purpose for which it can be used. Dr Alston says, that the surest mark of this balsam being pure and unadulterated is, its spreading quickly on the surface of water when dropped into it; and that if a single drop of it is let fall into a large saucer full of water, it immediately spreads all over its surface, and as it were dissolves and disappears; but in about half an hour it becomes a transparent pellicle covering the whole surface, and may be taken up with a pin, having lost both its fluidity and colour, and become white and soft, cohering, and communi-

cating its smell and taste to the water. This test, he says, all the balsam he saw in Holland bore, though it is rare to get any from London that answers it. The *balsamifera*, or rose-wood, affords an excellent timber: it is also replete with a fragrant balsam or oil, and retains its flavour and solidity though exposed to the weather many years. By subjecting this wood to distillation, Dr Wright thinks, a perfume equal to the *oleum rhodii* may probably be obtained.

ANA, among physicians, denotes a quantity equal to that of the preceding ingredient. It is abbreviated thus, *āā*, or *a*.

ANA, in matters of literature, a Latin termination, adopted into the titles of several books in other languages.—*Anas*, or *books in ana*, are collections of the memorable sayings of persons of learning and wit; much the same with what we otherwise call *table-talk*.

Wolfius has given the history of books in *ana*, in the preface to the *Casauboniana*. He there observes, that though such titles be new, the thing itself is very old; that Xenophon's books of the deeds and sayings of Socrates, as well as the dialogues of Plato, are *Socraticana*; that the apophthegms of the philosophers collected by Diogenes Laertius, the sentences of Pythagoras and those of Epictetus, the works of Athenæus, Stobæus, and divers others, are so many *anas*. Even the Gemara of the Jews, with several other oriental writings, according to Wolfius, properly belong to the same class. To this head of *ana* may likewise be referred the *Orphica*, the *Pythagoræa*, *Æsopica*, *Pyrrhoneia*, &c.

Scaligerana was the first piece that appeared with a title in *ana*. It was composed by Isan de Vassan, a young Champanois, recommended to Jos. Scaliger by Casaubon. Being much with Scaliger, who was daily visited by the men of learning at Leyden, De Vassan wrote down whatever things of any moment he heard Scaliger say. And thus arose the *Scaligerana*, which was not printed till many years after, at Geneva in 1666. Patin. Let. 431.—Soon after came the *Perroniana*, *Thuana*, *Naudæana*, *Patineana*, *Sorberiana*, *Menagiana*, *Anti-Menagiana*, *Furettiana*, *Chevæana*, *Leibnitziana*, *Arlequiniana*, *Poggiana*, &c.

ANABAPTISTON, the same with **ABAPTISTON**.

ANABAPTISTS, a name which has been indiscriminately applied to Christians of very different principles and practices; though many of them object to the denomination, and hold nothing in common, besides the opinion that baptism ought always to be performed by immersion, and not administered before the age of discretion.

The word *Anabaptist* is compounded of *ana*, "new," and *βαπτισμο*, "a baptist;" and in this sense the Novatians, the Cataphrygians, and the Donatists, may be considered as a kind of *Anabaptists* in the earlier ages, though not then denoted by this name; for they contended, that those Christians of the catholic church who joined themselves to their respective parties should be rebaptized. But we must not class under the same denomination those bishops of Asia and Africa, who, in the third century, maintained, that baptism administered by those whom they called heretics was not valid, and therefore that such of them as returned into their churches ought to be rebaptized. Nor do the

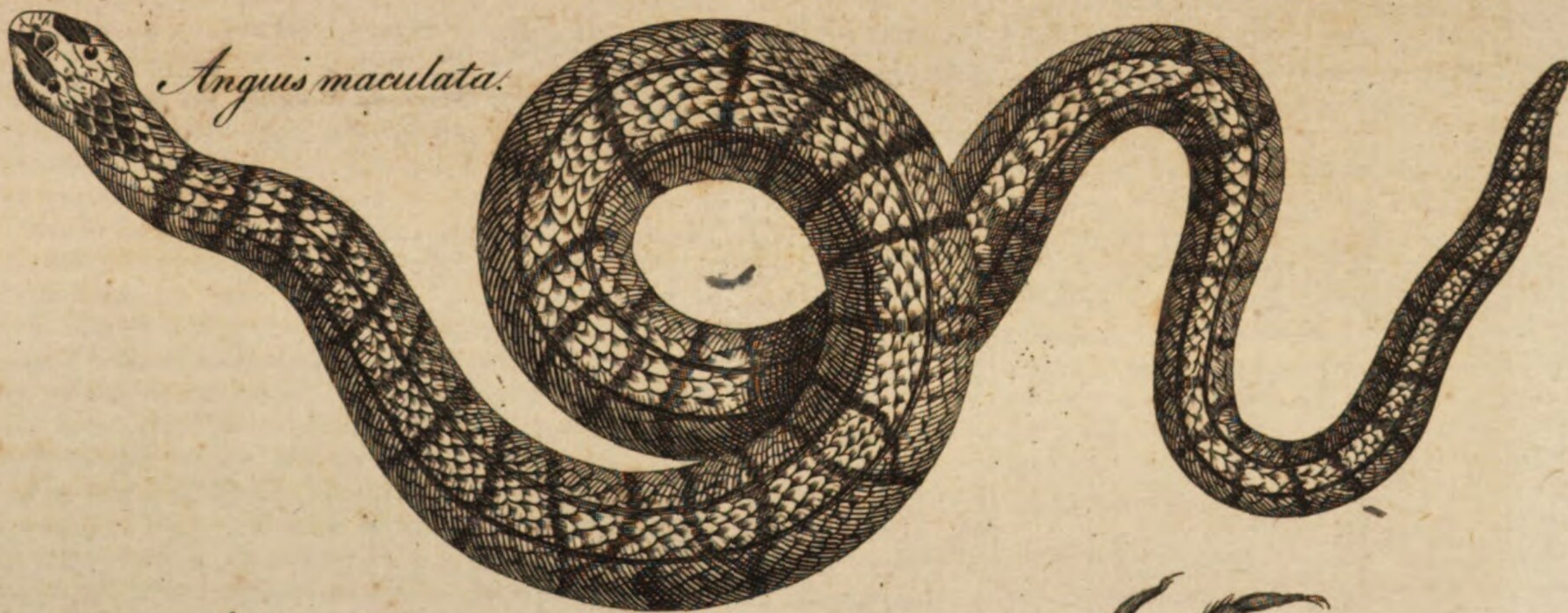
English

Ana,
I
Anabap-
tists.

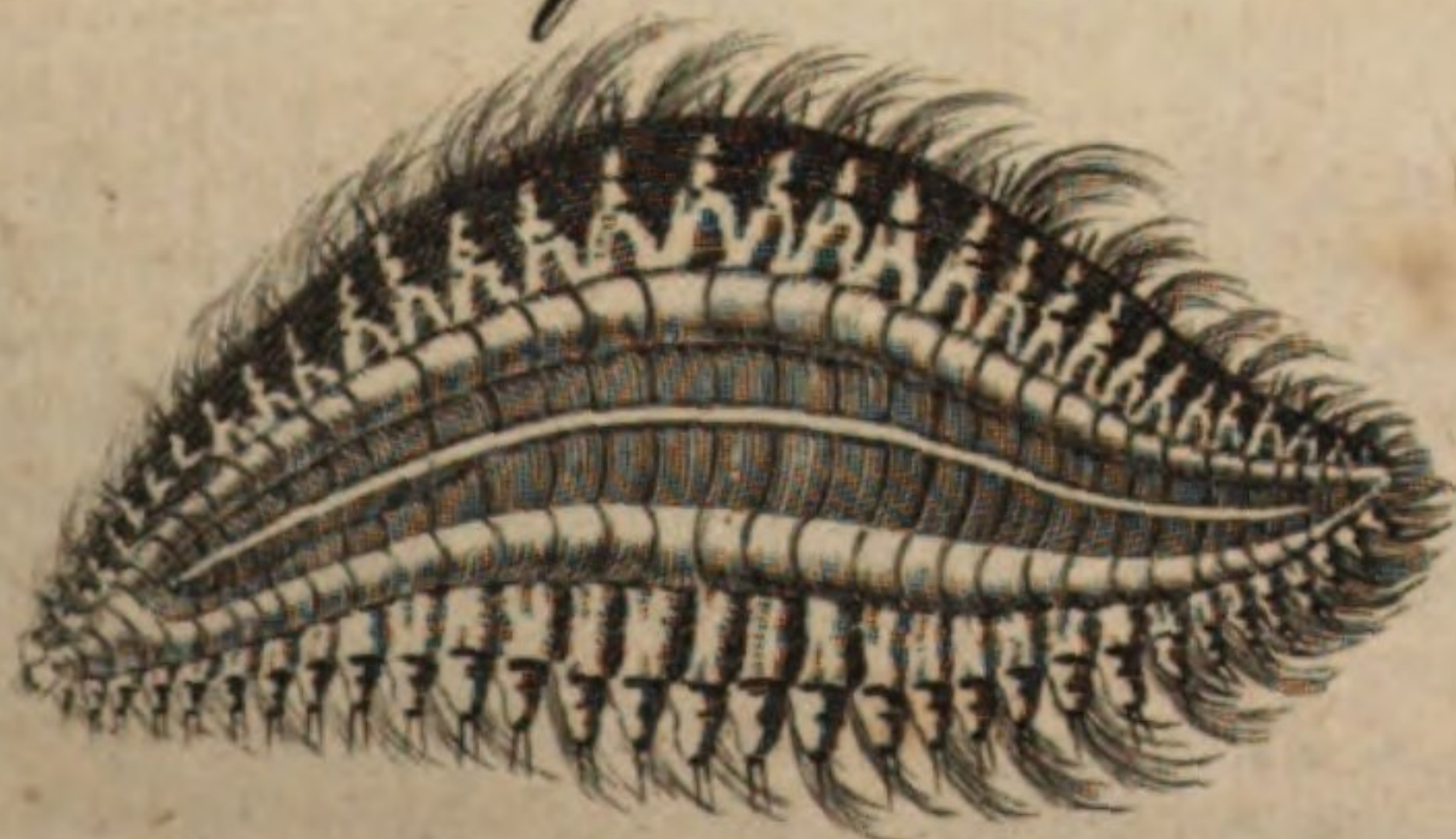
Amyris demifera.



Anguis maculata.



Aphrodita.



Aranca tarantula.



A. Bell. Prim. Nat. Sculptor fecit

Anabaptists. English and Dutch Baptists consider the denomination as at all applicable to their sect: by whom the baptism appointed by Christ is held to be "nothing short of *immersion, upon a personal profession of faith*;" of which profession infants being incapable, and sprinkling being no adequate symbol of the thing intended, the baptizing of proselytes to their communion, who in their infancy had undergone the ceremony of sprinkling, cannot, it is urged, be interpreted a repetition of the baptismal ordinance.

Anabaptists, in a strict and proper sense, appear to be those who not only rebaptize, when they arrive at an adult age, persons that were baptized in their infancy, but also, as often as any person comes from one of their sects to another, or as often as any one is excluded from their communion and again received into the bosom of their church, they baptize him. And such were many of the German Baptists. But the single opinion common to all the sects to which the name of *Anabaptists* has been indiscriminately applied, is that of the invalidity of *infant baptism*, in whatever way administered: And hence the general denomination of *Antipædobaptists*; which includes Anabaptists, Baptists, Mennonites, Waterlandians, &c. as distinguished by their respective peculiarities; though *Anabaptists* seem to have been adopted by most writers as the general term.

To the above peculiar notion concerning the baptismal sacrament, the Anabaptists added principles of a different nature, depending upon certain ideas which they entertained concerning a perfect church-establishment, pure in its members, and free from the institutions of human policy.

The Anabaptists appear to have made little noise, or to have been little noticed, before the time of the reformation in Germany. The most prudent and rational part of them considered it possible, by human wisdom, industry, and vigilance, to purify the church from the contagion of the wicked, provided the manners and spirit of the primitive Christians could but recover their lost dignity and lustre; and seeing the attempts of Luther, seconded by several persons of eminent piety, prove so successful, they hoped that the happy period was arrived in which the restoration of the church to purity was to be accomplished, under the divine protection, by the labours and counsels of pious and eminent men. Others, far from being satisfied with the plan of reformation proposed by Luther, looked upon it as much beneath the sublimity of their views; and consequently undertook a more perfect reformation, or, to express more properly their visionary enterprise, they proposed to found a new church, entirely spiritual, and truly divine.

This sect was soon joined by great numbers, and (as usually happens in sudden revolutions of this nature) by many persons, whose characters and capacities were very different, though their views seemed to turn upon the same object. Their progress was rapid; for, in a very short space of time, their discourses, visions, and predictions, excited commotions in a great part of Europe, and drew into their communion a prodigious multitude, whose ignorance rendered them easy victims to the illusions of enthusiasm. The most pernicious faction of all those which composed this motley multitude, was that which pretended that the founders of

Anabaptists. the new and *perfect church*, already mentioned, were under the direction of a divine impulse, and were armed against all opposition by the power of working miracles. It was this faction that, in the year 1521, began their fanatical work, under the guidance of Munzer, Stubner, Storck, &c.

These persons were disciples of Luther; but well knowing that their opinions were such as would receive no sanction from him, they availed themselves of his absence to disseminate them in Wettemburgh, and had the address to over-reach the piety of Melancthon. Their principal purpose was to gain over the populace, and to form a considerable party. To effect this, says Bayle, they were industrious and active, each in his own way. Storck wanting knowledge, boasted of inspiration; and Stubner, who had both genius and erudition, laboured at commodious explications of Scripture. Not content with discrediting the court of Rome, and decrying the authority of consistories, they taught, That among Christians, who had the precepts of the gospel to direct and the Spirit of God to guide them, the office of magistracy was not only unnecessary, but an unlawful encroachment on their spiritual liberty; that the distinctions occasioned by birth, or rank, or wealth, being contrary to the spirit of the gospel, which considers all men as equal, should be entirely abolished; that all Christians, throwing their possessions into one common stock, should live together in that state of equality which becomes members of the same family; that as neither the laws of nature nor the precepts of the New Testament had placed any restraint upon men with regard to the number of wives which they might marry, they should use that liberty which God himself had granted to the patriarchs.

They employed at first the various arts of persuasion in order to propagate their doctrine. They preached, exhorted, admonished, and reasoned, in a manner that seemed proper to impress the multitude; and related a great number of visions and revelations with which they pretended to have been favoured from above. But when they saw that these methods of making proselytes were not attended with such a rapid success as they fondly expected, and that the ministry of Luther and other eminent reformers were detrimental to their cause, they then had recourse to more expeditious measures, and madly attempted to propagate their fanatical doctrine by force of arms. Munzer and his associates, in the year 1525, put themselves at the head of a numerous army, composed for the most part of the peasants of Subia, Thuringia, Franconia, and Saxony, and declared war against all laws, government, and magistrates of every kind, under the chimerical pretext that Christ was now to take the reins of civil and ecclesiastical government into his own hands, and to rule alone over the nations. But this seditious crowd was routed and dispersed, without much difficulty, by the Elector of Saxony and other princes; and Munzer their ring-leader ignominiously put to death, and his factious counsellors scattered abroad in different places.

Many of his followers, however, survived, and propagated their opinions through Germany, Switzerland, and Holland. In the year 1533, a party of them settled at Munster under the direction of two Anabaptist prophets, John Matthias a baker of Haerlem, and John Bockholdt a journeyman taylor of Leyden. Having

Anabap-
tists.

ving made themselves masters of the city, they deposed the magistrates, confiscated the estates of such as had escaped, and deposited the wealth they amassed together in a public treasury for common use. They made preparations of every kind for the defence of the city; and sent out emissaries to the Anabaptists in the Low Countries, inviting them to assemble at Munster, which was now dignified with the name of Mount Sion, that from hence they might be deputed to reduce all the nations of the earth under their dominion. Matthias, who was the first in command, was soon cut off in an act of phrensy by the bishop of Munster's army; and was succeeded by Bockholdt, who was proclaimed by a special designation of Heaven, as he pretended, king of Sion, and invested with legislative powers like those of Moses. The extravagancies of Bockholdt were too numerous to be recited: It will be sufficient to add, that the city of Munster was taken after a long siege and an obstinate resistance; and Bockholdt the mock monarch was punished with a most painful and ignominious death.

It must, however, be acknowledged, that the true rise of the numerous insurrections of this period ought not to be attributed to religious opinions. The first insurgents groaned under the most grievous oppressions; they took up arms principally in defence of their civil liberties; and of the commotions that took place, the Anabaptist leaders above mentioned seem rather to have availed themselves, than to have been the prime movers. See the article REFORMATION.—That a great part of the main body, indeed, consisted of Anabaptists seems indisputable; and whatever fanaticism existed among them would naturally be called forth or be inflamed by the situations that occurred, and run riot in its wildest shapes. At the same time it appears from history, that a great part also consisted of Roman Catholics, and a still greater of persons who had scarcely any religious principles at all. Indeed, when we read of the vast numbers that were concerned in those insurrections, of whom it is reported that 100,000 fell by the sword, it appears reasonable to conclude that a great majority of them were not Anabaptists.

Before concluding this article, it must be remarked, that the Baptists or Mennonites in England and Holland are to be considered in a very different light from the enthusiasts we have been describing: And it appears equally uncandid and invidious, to trace up their distinguishing sentiment, as some of their adversaries have done, to those obnoxious characters, and there to stop, in order as it were to associate with it the ideas of turbulence and fanaticism, with which it certainly has no natural connection. Their coincidence with some of those oppressed and infatuated people in denying baptism to infants, is acknowledged by the Baptists: but they disavow the practice which the appellation of *Anabaptists* implies; and their doctrines seem referable to a more ancient and respectable origin. They appear supported by history in considering themselves as the descendants of the Waldenses, who were so grievously oppressed and persecuted by the despotic heads of the Romish hierarchy; and they profess an equal aversion to all principles of rebellion on one hand, and to all suggestions of fanaticism on the other. See BAPTISTS.—The denomination of *Mennonites*, by

which they are distinguished in Holland, they derive from Menno, the famous man who latterly gave consistency and stability to their sect: See MENNONITES. ANABASII, in antiquity, were couriers who were sent on horseback, or in chariots, with dispatches of importance.

ANABATHRA, in ancient writers, denote a kind of steps or ladder whereby to ascend to some eminence. In this sense we read of the anabathra of theatres, pulpits, &c. Anabathra appears to have been sometimes also applied to ranges of seats rising gradually over each other.

ANABATHRA is more particularly applied to a kind of stone blocks raised by the highway sides, to assist travellers in mounting or alighting, before the use of stirrups was invented.—The first author of this contrivance among the Romans was C. Gracchus brother of Tiberius.

ANABLEPS, in ichthyology, the trivial name of a species of cobitis. See COBITIS.

ANABOA, a small island situated near the coast of Loango in Africa, in E. Long. 9°. N. Lat. 1°. Here are several fertile valleys, which produce plenty of bananas, oranges, pine-apples, lemons, citrons, tamarinds, cocoa nuts, &c. together with vast quantities of cotton. In this island are two high mountains, which being continually covered with clouds, occasion frequent rains.

ANABOLÆUM, or ANABOLE, in antiquity, a kind of great or upper coat, worn over the tunica.

ANABOLEUS, in antiquity, an appellation given to grooms of the stable, or equerries, who assisted their masters in mounting their horses. As the ancients had no stirrups, or instruments that are now in use for mounting a horse, they either jumped upon his back, or were aided in mounting by anabolei.

ANACALYPTERIA, according to Suidas, were presents made to the bride by her husband's relations and friends when she first uncovered her face and showed herself to men. These presents were also called *παυλαία*: for, among the Greeks, virgins before marriage were under strict confinement, being rarely permitted to appear in public, or converse with the other sex; and when allowed that liberty, wore a veil over their faces, termed *καλυπτήν*, or *καλυπτρα*, which was not left off in the presence of men till the third day after marriage; whence, according to Hesychius, this day was also called *anacalypteron*.

ANACAMPSEROS, in botany, a synonyme of the portulaca and several other plants.

ANACAMPTERIA, in ecclesiastical antiquity, a kind of little edifices adjacent to the churches, designed for the entertainment of strangers and poor persons.

ANACAMPTIC, a name applied by the ancients to that part of optics which treats of reflection, being the same with what is now called CATOPTICS.

ANACARDIUM, or CASHEW-NUT TREE: A genus of the monogynia order, belonging to the decandria class of plants; and in the natural method ranking under the 12th order, *Holuraceæ*. The characters are: The *calyx* is divided into five parts, the divisions ovate and deciduous. The *corolla* consists of five reflected petals, twice the length of the *calyx*: The *stamina* consist of ten capillary filaments shorter than the *calyx*, one of them castrated; the antheræ are small and

Anacardium.

Anacardium occidentale

Mlanda —
New Zealand Lark

Amphisbana

Abbot's Pin. Ital. Sculptor fecit



Anacardium.

and roundish: The *pistillum* has a roundish germen; the stylus is subulated, inflected, and the length of the corolla; the stigma oblique: There is no *pericarpium*; the receptaculum is very large and fleshy: The seed is a large kidney-shaped nut, placed above the receptaculum.

Of this only one species is as yet known to the botanists, viz. the occidentale. It grows naturally in the West Indies, and arrives at the height of 20 feet in those places of which it is a native, but cannot be preserved in Britain without the greatest difficulty. The fruit of this tree is as large as an orange; and is full of an acid juice, which is frequently made use of in making punch. To the apex of this fruit grows a nut, of the size and shape of a hare's kidney, but much larger at the end which is next the fruit than at the other. The shell is very hard; and the kernel, which is sweet and pleasant, is covered with a thin film. Between this and the shell is lodged a thick, blackish, inflammable liquor, of such a caustic nature in the fresh nuts, that if the lips chance to touch it, blisters will immediately follow. The kernels are eaten raw, roasted, or pickled. The caustic liquor just mentioned is esteemed an excellent cosmetic with the West India young ladies, but they must certainly suffer a great deal of pain in its application; and as fond as our British females are of a beautiful face, it is highly probable they would never submit to be flayed alive to obtain one. When any of the former fancy themselves too much tanned by the scorching rays of the sun, they gently scrape off the thin outside of the stone, and then rub their faces all over with the stone. Their faces immediately swell and grow black; and the skin being poisoned by the caustic oil above mentioned, will, in the space of five or six days, come entirely off in large flakes, so that they cannot appear in public in less than a fortnight; by which time the new skin looks as fair as that of a new-born child. The negroes in Brazil cure themselves effectually of disorders in the stomach by eating of the yellow fruit of this tree; the juice of which, being acid, cuts the thick tough humours which obstructed the free circulation of the blood, and thus removes the complaint. This cure, however, is not voluntary: for their masters, the Portuguese, deny them any other sustenance; and letting them loose to the woods, where the cashew-nuts grow in great abundance, leave it in their option to perish by famine or sustain themselves with this fruit.—The milky juice of this tree will stain linen of a good black, which cannot be washed out. See Plate XVI.

Culture. This plant is easily raised from the nuts, which should be planted each in a separate pot filled with light sandy earth, and plunged into a good hot-bed of tanners bark; they must also be kept from moisture till the plants come up, otherwise the nuts are apt to rot. If the nuts are fresh, the plants will come up in about a month; and in two months more, they will be four or five inches high, with large leaves: from which quick progress many people have been deceived, imagining they would continue the like quick growth afterwards; but with all the care that can be taken, they never exceed the height of two feet and an half, and for the most part scarce half as much.

ANACEPHALÆOSIS, in rhetoric, the same with recapitulation. See RECAPITULATION.

ANACHARSIS, a famous Scythian philosopher, conversed with Solon, and lived an austere life. Upon his return from his travels through Greece, he attempted to change the ancient customs of Scythia, and to establish those of Greece; which proved fatal to him. The king shot him dead in a wood with an arrow. A great many statues were erected to him after his death. He is said to have invented tinder, the anchor, and the potter's wheel; but the latter is mentioned by Homer, who lived long before him. Anacharsis flourished in the time of Cræsus.

ANACHORET, in church-history, denotes a hermit, or solitary monk, who retires from the society of mankind into some desert, with a view to avoid the temptations of the world, and to be more at leisure for meditation and prayer. Such were Paul, Anthony, and Hilarion, the first founders of monastic life in Egypt and Palestine.

Anachorets, among the Greeks, consist principally of monks, who retire to caves or cells, with the leave of the abbot, and an allowance from the monastery; or who, weary of the fatigues of the monastery, purchase a spot of ground, to which they retreat, never appearing again in the monastery, unless on solemn occasions.

ANACHRONISM, in matters of literature, an error with respect to chronology, whereby an event is placed earlier than it really happened.—The word is compounded of *ανα*, "higher," and *χρονος*, "time." Such is that of Virgil, who placed Dido in Africa at the time of Æneas, though in reality she did not come there till 300 years after the taking of Troy.—An error on the other side, whereby a fact is placed later and lower than it should be, is called a *parachronism*.

ANACLASTIC GLASSES, a kind of sonorous phials, or glasses, chiefly made in Germany, which have the property of being flexible; and emitting a vehement noise by the human breath.—They are also called *vexing glasses* by the Germans (*vexier gläser*), on account of the fright and disturbance they occasion by their resiliation.—The anaclastic glasses are a low kind of phials with flat bellies, resembling inverted funnels, whose bottoms are very thin, scarce surpassing the thickness of an onion peel: this bottom is not quite flat, but a little convex. But upon applying the mouth to the orifice, and gently inspiring, or as it were sucking out the air, the bottom gives way with a prodigious crack, and of convex becomes concave. On the contrary, upon expiring or breathing gently into the orifice of the same glass, the bottom with no less noise bounds back to its former place, and becomes gibbous as before.—The anaclastic glasses first taken notice of were in the castle of Goldbach; where one of the academists *Naturæ Curiosorum*, having seen and made experiments on them, published a piece expressive on their history and phenomena. They are all made of a fine white glass. It is to be observed in these, 1. That if the bottom be concave at the time of inspiration, it will burst; and the like will happen if it be convex at the time of expiration. 2. A strong breath will have the same effect even under the contrary circumstances.

ANACLASTICS, that part of optics which considers

Anabaptists.

Anacleteria,
Anacreon.

siders the refraction of light, and is commonly called *Dioptrics*. See *DIOPTRICS*.

ANACLETERIA, in antiquity, a solemn festival celebrated by the ancients when their kings or princes came of age, and assumed the reins of government. It is so called, because proclamation being made of this event to the people, they went to salute their prince during the anacleteria, and to congratulate him upon his new dignity.

ANACLETICUM, in the ancient art of war, a particular blast of the trumpet, whereby the fearful and flying soldiers were rallied, and recalled to the combat.

ANACLINOPALE, *Ανακλινοπαλη*, in antiquity, a kind of wrestling, wherein the champions threw themselves voluntarily on the ground, and continued the combat by pinching, biting, scratching, and other methods of offence. The *Anaclinopale* was contradistinguished from the *Orthopale*, wherein the champions stood erect. In the *Anaclinopale*, the weaker combatants sometimes gained the victory.

ANACLINTERIA, in antiquity, a kind of pillows on the dining bed, whereon the guests used to lean. The ancient tricliniary beds had four pillows, one at the head, another at the feet, a third at the back, and a fourth at the breast. That on which the head lay, was properly called by the Greeks *ανακλιντήριον*, or *ανακλιντήριον*; by the Romans *fulcrum*, sometimes *pluteus*.

ANACOLLEMA, a composition of astringent powders, applied by the ancients to the head, to prevent effluents on the eyes.

ANACONDO, in natural history, is a name given in the isle of Ceylon to a very large and terrible rattlesnake, which often devours the unfortunate traveller alive, and is itself accounted excellent and delicious fare.

ANACREON, a Greek poet, born at Teos, a city of Ionia, flourished about 532 years before the Christian æra. Polycrates, tyrant of Samos, invited him to his court, and made him share with him in his business and his pleasures. He had a delicate wit, as may be judged from the inexpressible beauties and graces that shine in his works: but he was fond of pleasure, was of an amorous disposition, and addicted to drunkenness: yet, notwithstanding his debaucheries, he lived to the age of 85; when, we are told, he was choaked by a grape-stone which stuck in his throat as he was regaling on some new wine.

There is but a small part of Anacreon's works that remain; for, besides his odes and epigrams, he composed elegies, hymns, and iambics. His poems which are extant were rescued from oblivion by Henry Stephens, and are universally admired. The verses of Anacreon are sweeter, says Scaliger, than Indian sugar. His beauty and chief excellence, says Madam Dacier, lay in imitating nature, and in following reason; so that he presented to the mind no images but what were noble and natural. The odes of Anacreon, says Rapin, are flowers, beauties, and perpetual graces; it is familiar to him to write what is natural and to the life, he having an air so delicate, so easy, and graceful, that among all the ancients there is nothing comparable to the method he took, nor to that kind of writing he followed. He flows soft and easy, every where diffusing the joy and indolence of his mind thro' his verse,

N° 17.

and tuning his harp to the smooth and pleasant temper of his soul. But none has given a juster character of his writings than the God of Love, as taught to speak by Mr Cowley:

All thy verse is softer far
Than the downy feathers are,
Of my wings, or of my arrows,
Of my mother's doves and sparrows:
Graceful, cleanly, smooth or round,
All with Venus' girdle bound.

ANACREONTIC VERSE, in ancient poetry, a kind of verse, so called from its being much used by the poet Anacreon. It consists of three feet and an half, usually spondees and iambuses, and sometimes anapests: Such is that of Horace, *Lydia, dic per omnes*.

ANACRISIS, among the ancient Greeks, is used for a kind of trial or examination, which the archons, or chief magistrates of Athens, were to undergo before their admission into that office. The *anacrisis* stands distinguished from the *decimasia*, which was a second examination, in the forum. The *anacrisis* was performed in the senate-house. The question here proposed to them were concerning their family, kindred, behaviour, estate, &c. Some will have it that all magistrates underwent the *anacrisis*.

ANACRISIS, among civilians, an investigation of truth, interrogation of witnesses, and inquiry made into any fact, especially by torture.

ANACROSIS, in antiquity, denotes a part of the Pythian song, wherein the combat of Apollo and Python are described.—The *anacrosis* was the first part, and contained the preparation to the fight.

ANACYCLUS, in botany: a genus of the polygamia superflua order, belonging to the syngenesia class of plants, and, in the natural method, ranking under the 49th order, *Compositæ-discoides*. The characters are: The *calyx* is hemispheric and imbricated: The *corolla* is radiated: The *stamina* consist of five very short capillary filaments; the anthera cylindric and tubular: The *pistillum* has an oval germen; a filiform stylus; a bifid stigma in the hermaphrodites, two slender reflected stigmata in the females: There is no *pericarpium*; but the *calyx* unchanged: The *seeds* are solitary, with membranous wings; the *receptaculum* is chaffy.

ANADAVADÆA, in ornithology, a barbarous name of a species of *alauda*. See *ALAUDA*.

ANADEMA, among the ancients, denotes an ornament of the head, wherewith victors at the sacred games had their temples bound.

ANADIPLOSIS, in rhetoric and poetry, a repetition of the last word of a line, or clause of a sentence, in the beginning of the next: Thus,

*Pierides, vos hac facietis maxima Gallo:
Gallo cujus amor, &c.
Et matutinis accredula vocibus instat,
Vocibus instat, & assiduas jacet ore querelas.*

ANADROMOUS, among ichthyologists, a name given to such fishes as go from the sea to the fresh waters at stated seasons, and return back again; such as the salmon, &c. See *SALMON*.

ANADUOMENE VENUS, in the Grecian mythology, answered to the Sea-Venus in the Roman, and was the appellation given to one of the chief deities of the

Anacreontic,
Anaduomene.

Anædeia, the sea. The most celebrated picture in all antiquity was that of this goddess by Apelles; and the famous *Anagnosta*. Venus of Medici is a Sea-Venus.

ANÆDEIA, in antiquity, a denomination given to a silver stool placed in the Areopagus, on which the defendant, or person accused, was seated for examination. The word is Greek, *Anædeia*, which imports imprudence; but according to Junius's correction, it should rather be *Anastia*, q. d. *innocence*. The plaintiff, or accuser, was placed on an opposite stool called *hybris*, or injury; here he proposed three questions to the party accused, to which positive answers were to be given. The first, Are you guilty of this fact? The second, How did you commit the fact? The third, Who were your accomplices?

ANÆSTHESIA, signifies a privation of the senses.

ANAGALLIS, PIMPERNEL: A genus of the monogynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 20th order, *Rotaceæ*. The characters are: The *calyx* is a quinquepartite perianthium, which is persistent: The *corolla* consists of one rotated petal: The *stamina* consist of five erect filaments shorter than the corolla; the antheræ are simple: The *pistillum* has a globular germen: The stylus slightly declinated, the stigma headed: The *pericarpium* is a globular capsule, unilocular and circumscised: The *seeds* are numerous and angled; the receptaculum globular and very large. Of this there are four

Species. 1. The arvensis, or common pimpernel, with a red flower. 2. The fœmina, with a blue flower. 3. The monelli or narrow-leaved pimpernel. 4. The latifolia, or Spanish pimpernel.—The first sort is very common in corn-fields, and other cultivated places in Britain. The second is sometimes found wild in the fields, but is not so common as the first. The third is a beautiful small perennial plant, and produces numbers of fine blue flowers. The fourth is a native of Spain, and likewise produces blue flowers.

These plants are very easily propagated by seeds; and if suffered to remain till their seeds scatter, they become troublesome weeds.—The arvensis is not unfrequently taken as food; it makes no unpleasant salad, and in some parts of this kingdom is a common pot-herb. All the species are eat by cows and goats, but refused by sheep; small birds are greatly delighted with the seeds.—Great medicinal virtues were formerly expected from the first two species; but they are now justly disregarded.

ANAGNIA, (anc. geog.), a town of Latium, capital of the Hernici; which, after a faint resistance, submitting to the Romans, was admitted to the freedom of the city, yet without the right of suffrage, (Livy). It was afterwards a colony of Drusus Cæsar, and walled round, and its territory assigned to the veterans, (Frontinus.) Here Antony married Cleopatra, and divorced Octavia. Now *Anagni*, 36 miles to the east of Rome. Long. 13. 45. Lat. 42. 48.

ANAGNOSTA, or ANAGNOSTES, in antiquity, a kind of literary servant, retained in the families of persons of distinction, whose chief business was to read to them during meals, or at any other time when they were at leisure. Cornelius Nepos relates of Atticus, that he had always an agnostes at his meals. He ne-

VOL. I. Part II.

ver supped without reading; so that the minds of his guests were no less agreeably entertained than their appetites. The same custom, Eginhard observes, was kept up by Charlemagne, who at table had the histories and acts of ancient kings read to him. This custom seems to have been a relic of that of the ancient Greeks, who had the praises of great men and heroes sung to them while at table. The ancient monks and clergy kept up the like usage, as we are informed by St Augustin.

ANAGOGICAL, signifies mysterious, transporting; and is used to express whatever elevates the mind, not only to the knowledge of divine things, but of divine things in the next life. This word is seldom used, but with regard to the different senses of Scripture. The anagogical sense is, when the sacred text is explained with a regard to eternal life, the point which Christians should have in view: for example, the rest of the sabbath, in the anagogical sense, signifies the repose of everlasting happiness.

ANAGOGY, or ANAGOGE, among ecclesiastical writers, the elevation of the mind to things celestial and eternal.—It is particularly used, where words, in their natural or primary meaning, denote something sensible, but have a further view to something spiritual or invisible.

ANAGOGY, in a more particular sense, denotes the application of the types and allegories of the Old Testament to subjects of the New; thus called, because the veil being here drawn, what before was hidden, is exposed to open sight.

ANAGRAM (from the Greek *ana* backwards, and *γραμμα* letter,) in matters of literature, a transposition of the letters of some name, whereby a new word is formed, either to the advantage or disadvantage of the person or thing to which the name belongs. Thus, the anagram of Galenus is *angelus*; that of Logica, *caligo*; that of Alstedius, *sedulitas*; that of Loraine is *alerion*, on which account it was that the family of Loraine took *alerions* for their armoury.—Calvin, in the title of his *Institutions*, printed at Strasburg in 1539, calls himself *Alcuinus*, which is the anagram of Calvinus, and the name of an eminently learned person in the time of Charlemagne, who contributed greatly to the restoration of learning in that age.

Those who adhere strictly to the definition of an anagram, take no other liberty than that of omitting or retaining the letter *n*, at pleasure; whereas others make no scruple to use *e* for *æ*, *v* for *w*, *s* for *z*, and *c* for *k*; and *vice versa*.

Besides anagrams formed as above, we meet with another kind in ancient writers, made by dividing a single word into several; thus, *sus tineamus*, are formed out of the word *sustiniamus*.

Anagrams are sometimes also made out of several words: such is that on the question put by Pilate to our Saviour, *Quid est veritas?* whereof we have this admirable anagram, viz. *Est vir qui adest*.

The Cabbalists among the Jews are professed anagrammatists; the third part of their art which they call *themura*, i. e. “changing,” being nothing but the art of making anagrams, or of finding hidden and mystical meanings in names; which they do by changing, transposing, and differently combining, the letters of those

4 N.

names.

Anagogi-
cal,
Anagram.

Anagrammatist, names.—Thus, of the letters of Noah's name, they make *in grace*; of *now the Messiah*, they make *now he shall rejoice*.

Anak.

ANAGRAMMATIST, a maker or composer of anagrams. Thomas Billon, a provincial, was a celebrated anagrammatist, and retained by Lewis XIII. with a pension of 1200 livres, in quality of anagrammatist to the king.

ANAGROS, in commerce, a measure for grain used in some cities of Spain, particularly at Seville; 46 anagros make about $10\frac{1}{4}$ quarters of London.

ANAGYRIS, STINKING BEAN-TREFOIL: A genus of the monogynia order, belonging to the decandria class of plants; and, in the natural method, ranking under the 32d order, *Papilionaceæ*. The characters are: The *calyx* is a bell-shaped perianthium: The *corolla* is papilionaceous; the vexillum cordated, straight, emarginated, and twice as long as the calyx; the alæ ovate, and longer than the vexillum; the carina straight and very long: The *filamina* consist of 10 filaments; the antheræ simple: The *pistillum* has an oblong germen, a simple stylus, and a villous stigma: The *pericarpium* is an oblong legumen: The *seeds* are six or more, and kidney-shaped.

Of this genus there is but one species, the fetida, which grows naturally in the southern parts of Europe. It is a shrub which usually rises to the height of eight or ten feet, and produces its flowers in April or May. These are of a bright yellow colour, growing in spikes, somewhat like the laburnum.

Culture. This plant may be propagated either by seeds, or by laying down the tender branches in the spring; but the first method is preferable. The seeds should be sown toward the end of March in pots filled with light earth, and plunged in a gentle hot-bed. The plants usually appear in a month, when they should be gradually inured to the open air, that they may be hardened before winter. In the autumn and winter, they must be sheltered under a hot-bed frame: the spring following, they must be transplanted, each into a separate small pot, placed in a sheltered situation, and again removed into a frame to shelter them during the following winter. The second spring after the plants come up, some of them may be taken out of the pots, and planted in a border near a south-wall, where, if they are protected in winter, they may remain.

ANAGYRIS, or ANAGYRUS, the name of a place in Attica, of the tribe Erechtheis, where a fetid plant, called *Anagyris*, probably the same with the foregoing, grew in great plenty, (Dioscorides, Pliny, Stephanus;) and the more it was handled, the stronger it smelled: hence *commovere anagyrin* (or *anagyrum*), is to bring a misfortune on one's self, (Aristophanes.)

ANAK, the father of the Anakims, was the son of Arba, who gave his name to Kirjath-arba, or Hebron, Josh. xiv. 15. Anak had three sons, Sheshai, Ahiman, and Talmi, (chap. xv. 14. and Numb. xiii. 22.) who, as well as their father, were giants, and who with their posterity, all terrible for their fierceness and extraordinary stature, were called the *Anakims*; in comparison of whom the Hebrews, who were sent to view the land of Canaan, reported that they were but as grasshoppers. Numb. xiii. ult. Caleb, assisted by the tribe of Judah, took Kirjath-arba, and destroyed the Anakims, (Jud-

ges i. 20. and Josh. xv. 14.) in the year of the world 2559.

ANALECTA, or ANALECTES, in antiquity, a servant whose employment it was to gather up the off-falls of tables.

ANALECTA, *Analekts*, in a literary sense, is used to denote a collection of small pieces; as essays, remarks, &c.

ANALEMA, in geometry, a projection of the sphere on the plane of the meridian, orthographically made by straight lines and ellipses, the eye being supposed at an infinite distance, and in the east or west points of the horizon.

ANALEMMA, denotes likewise an instrument of brass or wood, upon which this kind of projection is drawn, with an horizon and cursor fitted to it, wherein the solstitial colure, and all circles parallel to it, will be concentric circles; all circles oblique to the eye, will be ellipses; and all circles whose planes pass through the eye, will be right lines. The use of this instrument is to show the common astronomical problems; which it will do, though not very exactly, unless it be very large.

ANALEPSIS, the augmentation or nutrition of an emaciated body.

ANALEPTICS, restorative or nourishing medicines.

ANALOGY, in philosophy, a certain relation and agreement between two or more things, which in other respects are entirely different.

There is likewise an analogy between beings that have some conformity or resemblance to one another; for example, between animals and plants; but the analogy is still stronger between two different species of certain animals.

Analogy enters much into all our reasoning, and serves to explain and illustrate. A great part of our philosophy, indeed, has no other foundation than analogy.

It is natural to mankind to judge of things less known, by some similitude, real or imaginary, between them and things more familiar or better known. And where the things compared have really a great similitude in their nature, when there is reason to think that they are subject to the same laws, there may be a considerable degree of probability in conclusions drawn from analogy. Thus we may observe a very great similitude between this earth which we inhabit, and the other planets, Saturn, Jupiter, Mars, Venus, and Mercury. They all revolve round the sun, as the earth does, although at different distances, and in different periods. They borrow all their light from the sun, as the earth does. Several of them are known to revolve round their axis like the earth, and, by that means, must have a like succession of day and night. Some of them have moons, that serve to give them light in the absence of the sun, as our moon does to us. They are all, in their motions, subject to the same law of gravitation, as the earth is. From all this similitude, it is not unreasonable to think, that those planets may, like our earth, be the habitation of various orders of living creatures. There is some probability in this conclusion from analogy.

But it ought to be observed, that, as this kind of reasoning can afford only probable evidence at best; so unless

Analogy.

Analogy. unless great caution be used, we are apt to be led into error by it. To give an instance of this: Anatomists, in ancient ages, seldom dissected human bodies; but very often the bodies of those quadrupeds whose internal structure was thought to approach nearest to that of the human body. Modern anatomists have discovered many mistakes the ancients were led into, by their conceiving a greater similitude between the structure of men and of some beasts than there is in reality.

*Reid on the
Intellectu-
al Powers,
Essay I.
ch. iv. p. 52.*

Perhaps no author has made a more just and a more happy use of this mode of reasoning, than bishop Butler in his *Analogy of Religion, Natural and Revealed to the Constitution and Course of Nature*. In that excellent work, the author does not ground any of the truths of religion upon analogy, as their proper evidence. He only makes use of analogy to answer objections against them. When objections are made against the truths of religion, which may be made with equal strength against what we know to be true in the course of nature, such objections can have no weight.

Analogical reasoning, therefore, may be of excellent use in answering objections against truths which have other evidence. It may likewise give a greater or a less degree of probability in cases where we can find no other evidence. But all arguments drawn from analogy are still the weaker, the greater disparity there is between the things compared; and therefore must be weakest of all when we compare body with mind, because there are no two things in nature more unlike.

There is no subject in which men have always been so prone to form their notions by analogies of this kind, as in what relates to the mind. We form an early acquaintance with material things by means of our senses, and are bred up in a constant familiarity with them. Hence we are apt to measure all things by them; and to ascribe to things most remote from matter the qualities that belong to material things. It is for this reason that mankind have, in all ages, been so prone to conceive the mind itself to be some subtle kind of matter: That they have been disposed to ascribe human figure, and human organs, not only to angels, but even to the Deity.

To illustrate more fully that analogical reasoning from a supposed similitude of mind to body, which appears to be the most fruitful source of error with regard to the operations of our minds, the following instance may be given. When a man is urged by contrary motives, those on one hand inciting him to do some action, those on the other to forbear it; he deliberates about it, and at last resolves to do it, or not to do it. The contrary motives are here compared to the weights in the opposite scales of a balance; and there is not perhaps any instance that can be named of a more striking analogy between body and mind. Hence the phrases of weighing motives, of deliberating upon actions, are common to all languages.

From this analogy, some philosophers draw very important conclusions. They say, that, as the balance cannot incline to one side more than the other, when the opposite weights are equal; so a man cannot possibly determine himself if the motives on both hands are equal; and as the balance must necessarily turn to that side which has most weight, so the man must necessarily be determined to that hand where the motive is strongest. And on this foundation some of the school-

men maintained, that if a hungry ass were placed between two bundels of hay equally inviting, the beast must stand still and starve to death, being unable to turn to either, because there are equal motives to both. This is an instance of that analogical reasoning, which, it is conceived, ought never to be trusted; for the analogy between a balance and a man deliberating, though one of the strongest that can be found between matter and mind, is too weak to support any argument. A piece of dead inactive matter, and an active intelligent being, are things very unlike; and because the one would remain at rest in a certain case, it does not follow that the other would be inactive in a case somewhat similar. The argument is no better than this, that, because a dead animal moves only as it is pushed, and, if pushed with equal force in contrary directions, must remain at rest; therefore the same thing must happen to a living animal; for surely the similitude between a dead animal and a living, is as great as that between a balance and a man.

The derivation of the word *Analogy* indicates, as professor Castillon of Berlin* observes, a resemblance discernible by reason. This is confirmed by the sense in which the term is used in geometry, where it signifies an equality of ratios.—In explaining this subject, it is observed, there may be a resemblance between sensations and a resemblance between perceptions: the former is called *physical resemblance*, because it acts upon the physical or sensitive faculty; the latter *moral resemblance*, because it affects the moral or rational faculty of man.

* *Hadrlem
Memoirs
for 1786, or
vol. xxii.*

Every resemblance may be reduced to an equality in sensations or perceptions; but this supposes some equality in their causes: we say *some equality*, because the disposition of the organs, or of the soul, must necessarily affect the sensations or perceptions; but this can influence only their degree, and not their nature.

The character of one person resembles that of another only when they both speak and act so as to excite equal perceptions, or to speak more strictly, the same perception; when they both display vivacity or indifference, anger or meekness, on the same occasions, and both excite in the soul of the observer identical perceptions, or rather the same perception of vivacity or indifference, of anger or meekness. These identical perceptions, the degree of which will depend much on the disposition of the observer's mind, must have identical causes, or, in other words, the same cause; which is the vivacity or indifference, the anger or meekness, displayed by each of these characters.

Every physical resemblance may therefore be reduced to one or more equalities; and every moral resemblance to one or more identities. Wherever there is moral resemblance there is analogy. Analogy may therefore be reduced to identity, and always supposes comparison.

Two objects are said to have an analogy to each other, or are called *analogous*, when some identity is discovered upon comparing them. An *analogical conclusion*, is a conclusion deduced from some identity.

The principles of analogy are a comparison of two objects; and one or more identities resulting from their being thus compared. The characters of analogy are—that two objects be compared—that there be one or more identities between these objects—and that this is discernible only by reason or intellect.

Analogy,
Analysis.

Physical resemblance is to the senses what analogy is to the understanding.—The former, when perfect, becomes equality; but the latter, identity.

Resemblance and analogy are the foundations both of probability and of certainty. When we are not satisfied that the resemblance or the analogy is complete, we stop at probability; which becomes certainty when we are, or think we are, assured that the resemblance or the analogy is perfect.

In reasoning by analogy, we should be careful not to confound it with resemblance; and also not to deduce from the identity or identities, on which the analogy is founded, a conclusion, which has either no relation, or only a partial relation, to these identities.

The principal use of analogy in the investigation of physical and moral truth, according to our author, may be reduced to the four following: 1. By means of our senses to improve, first our own judgment, and afterwards that of others, with respect to intellectual subjects. 2. To deduce a general from a particular truth. Having discovered and proved the truth of a proposition with respect to any particular object, examine whether this truth flows from a quality peculiar to this single object, or common to several objects. In the latter case all these objects may be comprehended under one general idea, founded on their common quality. Substitute this general idea instead of the particular object, and the proposition will become general, without ceasing to be true; because whatever evidently and solely results from the identity, on which an analogy is founded, must necessarily be true with respect to all those objects in which the analogy is the same. 3. To prove the truth or falsehood of propositions which cannot be otherwise demonstrated. 4. To discover new truths in both natural and moral philosophy.

ANALOGY, among grammarians, is the correspondence which a word or phrase bears to the genius and received forms of any language.

ANALYSIS, in a general sense, implies the resolution of something compounded into its original and constituent parts. The word is Greek, and derived from *αναλυω*, to resolve.

ANALYSIS, in mathematics, is properly the method of resolving problems by means of algebraical equations; whence we often find that these two words, *analysis* and *algebra*, are used as synonymous.

Analysis, under its present improvements, must be allowed the apex or height of all human learning: it is this method which furnishes us with the most perfect examples of the art of reasoning; gives the mind an uncommon readiness at deducing and discovering, from a few data, things unknown; and, by using signs for ideas, presents things to the imagination, which otherwise seemed out of its sphere: by this, geometrical demonstrations may be greatly abridged, and a long series of argumentations, wherein the mind cannot without the utmost effort and attention discover the connection of ideas, are hereby converted into sensible signs, and the several operations required therein effected by the combination of those signs. But, what is more extraordinary, by means of this art, a number of truths are frequently expressed by a single line, which in the common way of explaining and demonstrating things would fill whole volumes. Thus, by mere contempla-

tion of one single line, whole sciences may be sometimes learnt in a few minutes time, which otherwise could scarce be attained in many years.

ANALYSIS is divided, with regard to its object, into that of *finites* and *infinites*.

ANALYSIS of Finite Quantities, is what we otherwise call specious arithmetic or algebra. See ALGEBRA.

ANALYSIS of Infinites, called also the *New Analysis*, is particularly used for the method of fluxions, or the differential calculus. See FLUXIONS.

ANALYSIS, in logic, signifies the method of tracing things backward to their source, and of resolving knowledge into its original principles. This is also called the method of *resolution*: and stands opposed to the synthetic method, or that of *composition*.—The art of logical analysis consists principally in combining our perceptions, classing them together with address, and contriving proper expressions for conveying our thoughts, and representing their several divisions, classes, and relations.

ANALYSIS, in rhetoric, is that which examines the connections, tropes, figures, and the like, inquiring into the proposition, division, passions, arguments, and other apparatus of rhetoric.

Several authors, as Freigius and others, have given analyses of Cicero's Orations, wherein they reduce them to their grammatical and logical principles; strip them of all the ornaments and additions of rhetoric which otherwise disguise their true form, and conceal the connection between one part and another. The design of these authors is to have those admired harangues just such as the judgment disposed them, without the help of imagination; so that here we may coolly view the force of each proof, and admire the use Cicero made of rhetorical figures to conceal the weak part of a cause.

A collection has been made of the analyses formed by the most celebrated authors of the 16th century, in 3 vols folio.

ANALYSIS is also used, in chemistry, for the decomposition of a mixed body, or the separation of the principles and constituent parts of a compounded substance.

To analyze bodies, or resolve them into their component parts, is indeed the chief object of the art of chemistry. Chemistry furnishes several means for the decomposition of bodies, which are all founded on the differences of the properties belonging to the different principles of which the body to be analyzed is composed. If, for example, a body be composed of several principles, some of which have a great, and others a moderate degree of volatility, and, lastly, others are fixed, its most volatile parts may be first separated by a gradual heat in distilling vessels; and then the parts which are next in volatility will pass over in distillation; and lastly, those parts which are fixed, and capable of resisting the action of fire, will remain at the bottom of the vessel.

ANALYSIS is also used for a kind of syllabus, or table of the principle heads or articles of a continued discourse, disposed in their natural order and dependency. Analyses are more scientific than alphabetical indexes; but they are less used, as being more intricate.

ANALYSIS is likewise used for a brief, but methodical, illustration of the principles of a science; in which sense

Analytic, sense it is nearly synonymous with what we otherwise call a *synopsis*.

Anamaboa. ANALYTIC, or ANALYTICAL, something that belongs to, or partakes of, the nature of analysis.—Thus we say, an analytical demonstration, analytical process, analytical table or scheme, analytical method of investigation, &c.

The analytic method stands opposed to the synthetic. In natural philosophy, as in mathematics, the investigation of difficult things by the analytic method ought to precede the method of composition. This analysis consists in making experiments and observations, and in drawing general conclusions therefrom by induction; and admitting of no objections against the conclusions, but such as are drawn from experiments, and other certain truths: and though the reasoning from experiments and observations by induction be no demonstration of general conclusions, yet it is the best method of reasoning which the nature of things admits of; and may be esteemed so much the stronger, as the induction is more general; and, if no exception occur from phenomena, the conclusion may be pronounced general. By this way of analysis, we may proceed from compounds to their ingredients; from motions to the forces producing them; and in general from effects to their causes, and from particular causes to more general ones, until we arrive at those which are the most general. This is the analytic method, according to the illustrious Newton.

The synthetic method consists in assuming the causes discovered and received as principles: and by them explaining the phenomena proceeding from them, and proving the explanations. See **SYNTHESIS**.

ANALYTICS, *Analytica*, the science and use of analysis. The great advantage of the modern mathematics above the ancient is in point of analytics.

Pappus, in the preface to his seventh book of Mathematical Collections, enumerates the authors on the ancient analytics; being Euclid, in his *Data* and *Porismata*; Apollonius, *de Sectione Rationis*, and in his *Conics*; Aristæus, *de Locis Solidis*; and Eratosthenes, *de Mediis Proportionalibus*. But the ancient analytics were very different from the modern.

To the modern analytics principally belong algebra; an historical account of which, with the several authors thereon, see under the article **ALGEBRA**.

ANAMABOA, a populous town in the kingdom of Fantin, in Guinea. The natives are generally great cheats, and must be carefully looked after in dealing with them, and their gold well examined, for it is commonly adulterated. It lies under the cannon of the English castle. The landing is pretty difficult on account of the rocks: and therefore those that come here to trade are forced to go ashore in canoes. The earth here is very proper to make bricks; the oysters, when burnt, afford good lime; and there is timber in great abundance; so that here are all the materials for building. The country at Anamaboa is full of hills, beginning at a good distance from the town, and affording a very pleasant prospect. Indian corn and palm-wine are in great plenty. They have a green fruit called *papas*, as big as a small melon, and which has a taste like cauliflower. Anamaboa is much frequented by the English ships and others for corn and slaves, which last are sometimes to be had in great

numbers. The English fort is built on the foundation of a large old house, which subsisted entire in 1679. It is a large edifice, flanked by two towers, and fortified towards the sea with two bastions: the whole of brick and stone cemented with lime. It stands upon a rock at the distance of 30 paces from the sea. It is mounted with 12 pieces of cannon and 12 patereroes; and defended by a garrison of 12 whites and 18 blacks, under the command of the chief factor.

The natives treat the garrison of this fort with great insolence, inasmuch as often to block them up, and frequently, if they dislike the governor, send him off in a canoe to Cape Coast with marks of the utmost contempt. Far from being able to oppose them, the English are glad to obtain their favour with presents. In 1701, they declared war against the English; and having assembled in a tumultuous manner before the fort, they set fire to the exterior buildings, and went on with their outrages, till they were dispersed by a discharge of the cannon from the batteries. The night following the English took their revenge, by setting fire to the town of Anamaboa; and thus hostilities continued for 20 days, till at last the natives were obliged to sue for peace. This fort was abandoned in 1733; but has been resumed by the English, who have continued in it ever since.

ANAMELECH, an idol of the Sepharvites, who are said in Scripture to have burned their children in honour of Adramelech and Anamelech.—These idols probably signified the sun and moon. Some of the rabbins represent Anamelech under the figure of a mule, others under that of a quail or pheasant.

ANAMIM, the second son of Mizraim (Gen. x. 13.). Anamim, if we may credit the paraphrast Jonathan the son of Uzziel, peopled the Mareotis; or the Pentapolis of Cyrene, according to the paraphrast of Jerusalem. Bochart is of opinion that these Anamims were the people that dwelt in the parts adjacent to the temple of Jupiter Ammon, and in the Nafamontis. Calmet thinks the Amanians and Garamantes to be descended from Anamim.

ANAMORPHOSIS, in perspective drawings, is a deformed or distorted portrait or figure, generally confused and unintelligible to the common unassisted view; but when seen at a certain distance and height, or as reflected from a plain or curved mirror, will appear regular and in right proportion. See **OPTICS** (the *Index*), and **PERSPECTIVE**.

ANANAS, in botany, the trivial name of a species of bromelia. See **BROMELIA**.

ANANCITIS, in antiquity, a kind of figured stone, otherwise called *synochitis*, celebrated for its magical virtue of raising the shadows of the infernal gods.

ANANIAS, a Sadducee, high-priest of the Jews, who put to death St James the brother of our Lord, and was deposed by Agrippa.

ANANISABTA, or ANANISAPTA, a magical word frequently found inscribed on coins and other amulets, supposed to have a virtue of preserving the wearer from the plague.

ANAPÆST, in ancient poetry, a foot consisting of two short syllables and one long: Such is the word *scōpūlōs*. It is just the reverse of the dactyl.

ANAPÆSTIC VERSES, those consisting wholly or chiefly of anapests.

ANAPHE,

Aname-
lech,
||
Anapæstic.

Anaphe,
Anarrhicas

ANAPHE (anc. geog.), an island spontaneously emerging out of the Cretan sea, near Thera (Pliny, Strabo); now called *Nanfio*. Its name is from the sudden appearance of the new moon to the Argonauts in a storm (Apollonius), *Anaphaus*, an epithet of Apollo, who was worshipped there. *Anaphæi*, the people.

ANAPHORA, in rhetoric, the repetition of the same word or words in the beginning of a sentence or verse: Thus Virgil,

*Pan etiam Arcadia mecum se iudice certet,
Pan etiam Arcadia dicat se iudice victum.*

ANAPHORA, among physicians, the throwing off purulent matter by the mouth.

ANAPHRODISIA, signifies impotence, or want of power to procreate. See IMPOTENCE.

ANAPLASIS, signifies the replacing or setting a fractured bone.

ANAPLORETICS, medicines that promote the growth or granulation of the flesh in wounds, ulcers, &c.

ANARCHI; *Ἀναρχοί*, in antiquity, a name given by the Athenians to four supernumerary days in their year, during which they had no magistrates. The Attic year was divided into ten parts, according to the number of tribes, to whom the precedence of the senate fell by turns. Each division consisted of 35 days; what remained after the expiration of these, to make the lunar year complete, which according to their computation consisted of 354 days, were employed in the creation of magistrates, and called *ἄναρχοι ἡμέραι*, and *ἄρχαιόμοροι*.

ANARCHY, the want of government in a nation, where no supreme authority is lodged, either in the prince or other rulers; but the people live at large, and all things are in confusion. The word is derived from the Greek privative *α*, and *αρχή*, command, principality. Anarchy is supposed to have reigned after the deluge, before the foundation of monarchies. We still find it obtain in several parts, particularly of Africa and America.

ANARCHY is also applied to certain troublesome and disorderly periods, even in governments otherwise regular. In England, the period between the death of Cromwell and King Charles's restoration is commonly represented as an *anarchy*. Every month produced a new scheme or form of government. Enthusiasts talked of nothing but annulling all the laws, abolishing all writings, records, and registers, and bringing all men to the primitive level. No modern nation is more subject to anarchies than Poland; where every interval between the death of one king and the election of another is a perfect picture of confusion, inasmuch that it is a proverb among that people, *Poland is governed by confusion*. The Jewish history presents numerous instances of anarchies in that state, usually denoted by this phrase, *that in those days there was no king in Israel, but every man did that which was right in his own eyes*; which is a just picture of an *anarchy*.

ANARRHICAS, in ichthyology, a genus of fishes of the order of apodes. There is but one species of this genus, viz. the *anarrhicas lupus*, or sea-wolf; which seems to be confined to the northern parts of the globe. We find it in the seas of Greenland; in those of Ice-

land and Norway; on the coasts of Scotland and of Anarrhicas Yorkshire; and lastly, in that part of the German ocean which washes the shores of Holland, the most southern of its haunts that we can with any certainty mention.

It is a most ravenous and fierce fish, and, when taken, fastens on any thing within its reach: the fishermen dreading its bite, endeavour as soon as possible to beat out its fore-teeth, and then kill it by striking it behind the head. Schonevelde relates, that its bite is so hard that it will seize on an anchor, and leave the marks of its teeth in it; and the Danish and German names of *steebider* and *steinbeisser*, express the sense of its great strength, as if it was capable of crushing even stones with its jaws.

It feeds almost entirely on crustaceous animals and shell-fish, such as crabs, lobsters, prawns, muscles, scollops, large whelks, &c. these it grinds to pieces with its teeth, and swallows with the lesser shells. It does not appear they are dissolved in the stomach, but are voided with the feces; for which purpose the aperture of the anus is wider than in other fish of the same size.

It is full of roe in February, March, and April, and spawns in May and June.

This fish has so disagreeable and horrid an appearance, that nobody at Scarborough except the fishermen will eat it, and they prefer it to holibut. They always before dressing take off the head and skin.

The sea-wolf grows to a large size: those on the Yorkshire coast are sometimes found of the length of four feet; according to Dr Gronovius, they have been taken near Shetland, seven feet long, and even more.

The head is a little flattened on the top; the nose blunt; the nostrils are very small; the eyes small, and placed near the end of the nose.

The teeth are very remarkable, and finely adapted to its way of life. The fore-teeth are strong, conical, diverging a little from each other, stand far out of the jaws, and are commonly six above and the same below, tho' sometimes there are only five in each jaw: these are supported within-side by a row of lesser teeth, which makes the number in the upper jaw 17 or 18, in the lower 11 or 12. The sides of the under jaw are convex inwards, which greatly adds to their strength, and at the same time allows room for the large muscles with which the head of this fish is furnished. The *dentes molares*, or grinding teeth of the under jaw, are higher on the outer than the inner edges, which inclines their surfaces inward: they join to the canine teeth in that jaw, but in the upper are separate from them. In the centre are two rows of flat strong teeth, fixed on an oblong basis upon the bones of the palate and nose.

The teeth of the *anarrhicas* are often found fossil; and in that state called *busonites*, or *toad-stones*: these were formerly much esteemed for their imaginary virtues, and were set in gold, and worn as rings.

The two bones that form the under jaw are united before by a loose cartilage; which mechanism admitting of a motion from side to side, most evidently contributes to the design of the whole, viz. a facility of breaking, grinding, and comminuting, its testaceous and crustaceous food. At the entrance of the gullet, above and below, are two echinated bones: these are

very

Anarropia, very small, being the less necessary, as the food is in a great measure comminuted in the mouth by aid of the grinders.

The body is long, and a little compressed sidewise; the skin smooth and slippery: it wants the lateral line. The pectoral fins consist of 18 rays. The dorsal fin extends from the hind-part of the head almost to the tail; the rays in the fresh fish are not visible. The anal fin extends as far as the dorsal fin. The tail is round at its end, and consists of 13 rays. The sides, back, and fins, are of a livid lead colour; the two first marked downwards with irregular obscure dusky lines: these in different fish have different appearances. The young are of a greenish cast, resembling the sea-wrack, amongst which they reside for some time after their birth.

ANARROPIA, among physicians, a tendency of the humours to the head or superior parts.

ANAS (anc. geog.), a river of Spain, rising in the territory of Laminium of the Hither Spain, and now spreading into lakes, again restraining its waters, or, burrowing itself entirely in the earth, is pleased often to reappear; it pours into the Atlantic (Pliny); now *Guadiana*, rising in the south-east of New Castile, in a district commonly called Campo de Montiel, not far from the mountain Consuegra, from the lakes called *las Lagunas de Guadiana*, and then it is called *Rio Roydera*; and, after a course of six leagues, burying itself in the earth for a league, it then rises up again from three lakes, called *los Ojos de Guadiana*, near the village Villa Harta, five leagues to the north of Calatrava, and directs its course westward through New Castile, by Medelin, Merida, and Badajoz, where it begins to bend its course southwards, between Portugal and Andalusia, falling into the bay of Cadiz near Ayamonté.

ANAS, in ornithology, a genus of birds belonging to the order of anseres. The beak of this genus is a little obtuse, covered with an epidermis or skin, gibbous at the base and broad at the apex: the tongue is obtuse and fleshy; the feet are webbed and fitted for swimming. The species are,

1. The cygnus, *ferus & mansuetus*.

a. The *ferus*, with a semicylindrical black bill, yellow wax, and a white body, is the whistling or wild swan of English authors, and is less than the tame or mute species, being about five feet in length. These birds inhabit the northern world as high as Iceland, and as low as the soft climate of Greece or of Lydia, the modern Anatolia, in Asia Minor: it even descends as low as Egypt. They swarm, during summer, in the great lakes and marshes of the Tartarian and Siberian deserts; and resort in great numbers to winter about the Caspian and Euxine seas. Those of the eastern parts of Siberia retire beyond Kamtschatka, either to the coasts of America, or to the isles north of Japan. In Siberia they spread far north, but not to the Arctic circle. They arrive in Hudson's Bay about the end of May, where they breed in great numbers on the shores, in the islands, and in the inland lakes; but all retire to the southern parts of North America in autumn, even as low as Carolina and Louisiana. In Carolina they are said to be of two sorts; the larger, called from its note the *Trumpeter*, arrive in great flocks to the fresh rivers in winter, and in February retire to the great lakes to breed: the lesser are called

Hoopers, and frequent mostly the salt water. The Indians of Louisiana wear the skins, with the down attached to them, sewed together by way of covering; and of the larger feathers they make diadems for their chiefs, as well as weave the smaller on threads, as barbers do for their wigs, with which they cover garments, which are worn only by women of the highest rank. In August these birds lose their feathers, and are not able to fly; when the natives of Iceland and Kamtschatka hunt them with dogs, which catch them by the neck, and easily secure their prey. In the last place they are also killed with clubs. The eggs are accounted good food; and the flesh, especially that of the young, is much esteemed by the inhabitants. The uses of the feathers are manifest to every one; and the skins of the body are worn by the inhabitants; besides which, that of the legs, taken off whole, is used for purses, and appears not unlike shagreen. Wild swans, Linnæus says, frequently visit Sweden after a thaw, and are caught with apples in which a hook is concealed. The wild swan frequents our coasts in hard winters in large flocks, but does not breed in Great Britain. Martin * acquaints us, that swans come in October in great numbers to Lingey, one of the West-
 * *Descript West. Isles*
 71.
 ern Isles; and continue there till March, when they return northward to breed. A few continue in Mainland, one of the Orkneys, and breed in the little isles of the fresh-water lochs; but the multitude retires at the approach of spring. On that account, swans are there the country-man's almanack: on their quitting the isle, they presage good weather; on their arrival, they announce bad. These, as well as most other water-fowl, prefer, for the purpose of incubation, those places that are least frequented by mankind: accordingly we find that the lakes and forests of the distant Lapland are filled during summer with myriads of water-fowl; and there swans, geese, the duck-tribe, goosanders, divers, &c. pass that season; but in autumn return to us, and to other more hospitable shores.

This species has several distinctions from the species which we in Britain call the *tame swan*. In Russia this species more fitly claims the name, it being the kind most commonly tamed in that empire. The whistling swan carries its neck quite erect, the other swims with it arched. This is far inferior in size. This has twelve ribs on a side, the mute only eleven. But the most remarkable is the strange figure of the windpipe; which falls into the chest, then turns back like a trumpet, and afterwards makes a second bend to join the lungs. Thus it is enabled to utter a loud and shrill note. The other swan, on the contrary, is the most silent of birds: it can do nothing more than hiss, which it does on receiving any provocation. The vocal kind emits its loud notes only when flying or calling. Its sound is, *whoogh, whoogh*, very loud and shrill, but not disagreeable, when heard far above one's head and modulated by the winds. The natives of Iceland compare it to the notes of a violin. In fact, they hear it (says Mr Pennant) at the end of their long and gloomy winter, when the return of the swans announces the return of summer; every note must be therefore melodious which presages the speedy thaw, and the release from their tedious confinement.

It is from this species alone that the ancients have given the fable of the swan being endued with the powers

Anas.

powers of melody. Embracing the Pythagorean doctrine, they made the body of this bird the mansion of the souls of departed poets; and after that, attributed to the birds the same faculty of harmony which their inmates possessed in a pre-existent state. The vulgar, not distinguishing between sweetness of numbers and melody of voice, thought that real which was only intended figuratively. The mute swan, Mr Pennant observes, never frequents the Padus, nor is ever seen on the Cayster in Lydia; each of them streams celebrated by the poets for the great resort of swans.

In time, a swan became a common trop for a *bard*. Horace calls Pindar *Dirceum Cygnum*; and in one ode even supposes himself changed into a swan. Virgil speaks of his poetical brethren in the same manner:

Vare, tuum nomen

Cantantes sublime ferent ad sidera cygni. Eclog. ix.

When he speaks of them figuratively he ascribes to them melody, or the power of music; but when he talks of them as birds, he lays aside fiction, and, like a true naturalist, gives them their real note:

Dant sonitum rauci per stagna loquacia cygni.

Æneid. Lib. x. 50.

It was also a popular opinion among the ancients that the swan foretold its own end. To explain this, we must consider the twofold character of the poet, *vates* and *poeta*, which the fable of the transmigration continues to the bird; or they might be supposed to derive that faculty from Apollo their patron deity, the god of prophecy and divination.

As to their being supposed to sing more sweetly at the approach of death, the cause is beautifully explained by Plato, who attributes that unusual melody to the same sort of ecstacy that good men are sometimes said to enjoy at that awful hour, foreseeing the joys that are preparing for them on putting off mortality.

β. The *mansuetus*, or mute swan, is the largest of the British Birds. It is distinguished externally from the wild swan; first, by its size, being much larger; secondly, by its bill, which in this is red, and the tip and sides black, and the skin between the eyes and bill is of the same colour. Over the base of the upper mandible, projects a black callous knob: the whole plumage, in old birds, is white; in young ones, ash-coloured till the second year: the legs are dusky: but Dr Plott mentions a variety found on the Trent near Rugely, with red legs.

The swan is found wild in Russia and Siberia, most plentiful in the last. It arrives later from the south, and does not spread so far north. Those about the southern part of the Caspian Sea are very large, and much esteemed for the use of the table. The swan is held in high veneration by the Mahometans. It is a very strong bird, and sometimes exceeding fierce: has not unfrequently been known to throw down and trample under feet youths of fifteen or sixteen years of age, and an old one to break the leg of a man with a stroke of the wings. It is said to be very long-lived, and frequently to arrive at the hundredth year. The young are not perfect in plumage till the second year. The swan lays the first egg in February, and continues laying every other day to the amount of six, seven, or eight eggs; these it places on a bed of grass near the

N° 17.

water, and sits six weeks. It feeds on both fish and herbage. Anas.

No bird, perhaps, makes so inelegant a figure out of the water, or has the command of such beautiful attitudes on that element, as the swan: almost every poet has taken notice of it; but none with that justness of description, and in so picturesque a manner, as our Milton:

The swan, with arched neck

Between her white wings mantling, proudly rows
Her state with oary feet. *Par. Lost, B. vii.*

In former times, it was served up at every great feast, when the elegance of the table was measured by the size and quantity of the good cheer. Cygnets are to this day fattened at Norwich about Christmas, and are sold for a guinea a-piece.

Swans were formerly held in such great esteem in England, that by an act of Edward IV. c. 6. "no one that possessed a freehold of less clear yearly value than five marks, was permitted to keep any, *other than the son of our sovereign lord the king.*" And by the eleventh of Henry VII. c. 17. the punishment for taking their eggs was imprisonment for a year and a day, and a fine at the king's will. Though at present they are not so highly valued as a delicacy, yet great numbers are preserved for their beauty; we see multitudes on the Thames and Trent, but no where greater numbers than on the salt-water inlet of the sea near Abbotsbury in Dorsetshire.

2. The *cygnoides*, with a semicylindrical bill, gibbous wax, and tumid eye-brows. It is the swan-goose of Ray, from Guinea. There is likewise a variety of this species, of a less size, called the *goose of Muscovy*. They are found wild about the Lake Baikal in the east of Siberia, and in Kamtschatka. They are also kept tame in most parts of the Russian empire. These birds likewise inhabit China, and are common at the Cape of Good Hope. This is no doubt the species mentioned by Kolben called *crop-goose*; who says, that the sailors make tobacco-pouches and purses of the membrane which hangs beneath the throat, as it is sufficiently tough for such purposes, and will hold two pounds of tobacco.

They are sufficiently common in Britain, and readily mix with the common goose; the breeds uniting as freely, and continuing to produce as certainly, as if no such mixture had taken place. They are much more noisy than the common tame geese, taking alarm at the least noise; and even without disturbance will emit their harsh and disagreeable scream the whole day through. They walk very erect, with the neck much elevated; and as they bear a middle line between that of the swan and goose, they have not improperly been called *swan-goose*.

3. The *tadorna*, or sheildrake, has a flat bill, a compressed forehead, a greenish black head, and the body is variegated with white. This species is found as far as Iceland to the north. It visits Sweden and the Orkneys in the winter, and returns in spring. It is found in Asia about the Caspian Sea, and all the salt lakes of the Tartarian and Siberian deserts, as well as in Kamtschatka. Our voyagers, if right in the species, have also met with it at Falkland Isles and Van Diemen's Land. It breeds in deserted rabbit holes, or occupies them

Anas. them in the absence of the owners, who, rather than make an attempt at dislodging the intruders, form others; though, in defect of ready-made quarters, these birds will frequently dig holes for themselves. They lay fifteen or sixteen roundish white eggs. These are placed at the farther end of the hole, covered with down supplied from the breast of the female, who sits about 30 days. She is very careful of the young, and will often carry them from place to place in her bill: "this we are certain of (says Mr Latham), from a young one having been dropt at the foot of an intelligent friend unhurt, by the mother flying over his head." When a person attempts to take their young, the old birds show great address in diverting his attention from the brood: they will fly along the ground as if wounded, till the former are got into a place of security, and then return and collect them together. From this instinctive cunning, Turner, with good reason, imagines them to be the *chenalopex*, or *fox-goose*, of the ancients. The natives of the Orkneys to this day call them the *fly-goose*, from an attribute of that quadruped.

The young, as soon as hatched, take to the water, and swim surprisingly well; but do not come to their full plumage till the second year. This species, Mr Latham informs us, may be hatched under a tame duck, and the young readily brought up; but are apt, after a few years, to attempt the mastery over the rest of the poultry. In a state of nature, the food seems chiefly to be small fish, marine insects, and shells; herbage has likewise been found in their stomachs. In a tame state will eat bread, grain, and greens. Their great beauty would tempt us to endeavour at domesticating the race; but it will not thrive completely, except in the neighbourhood of salt water, which somehow seems essential to its well-being. The flesh likewise is rank and unfavoury, though the eggs have at all times been thought very good.

3. The *spectabilis*, has a compressed bill gibbous at the base, a black feathered carina, and a hoary head. It is the grey-headed duck of Edwards, and the king-duck of Pennant. This beautiful species is found at Hudson's Bay, at Churchill River, and (though scarce) at York Fort; in winter it is met with as far south as New York. It is pretty frequent in the north of Siberia and Kamtschatka; it is found also on the coast of Norway, and has been killed in the Orkneys. It is common in Greenland; where the flesh is accounted excellent, and the crude gibbous part of the bill a great delicacy. It produces a down equally valuable as the eider. The skins are sewed together, and make warm garments. The natives kill them with darts, and use the following method to succeed:—A number of men in canoes falling in with a flock while swimming, on a sudden set up a shouting, making as much noise as they can; on which, the birds being too much frightened to fly away, dive under the water; but as the place at which they are to rise again is known by the bubbling of the water above, the hunters follow them up as close as may be; and after acting this three or four times over, the birds become so fatigued as to be easily killed.—This species builds on the sides of ponds and rivers, making its nest of sticks and moss, and lining it with feathers from the breast. It lays four or five whitish eggs, as large as those of the goose. The

VOL. I. Part II.

young fly in July. The food consists chiefly of worms and grass.

5. The *fusca*, or velvet duck, is of a blackish colour, has a white spot behind the eyes, and a white line on the wings. The male of this species is distinguished by a gibbosity at the base of the bill. It is the black duck of Ray, and is in length about 20 inches. This species frequents Hudson's Bay in summer, where it breeds. The nest is composed of grass; in which it lays from four to six white eggs, and hatches in July. It feeds on grass, and is known by the name of *cus cusi qua tum*. It retires south in winter; when it is frequently seen as far south as New York. Our late navigators met with it at Aoonalashka. It is now and then seen on the coasts of England, but is not common. It is more frequent on the continent, inhabiting Denmark and Russia. In some parts of Siberia it is very common; and it enters the list of those found at Kamtschatka. In breeding-time, it goes far inland to lay the eggs, which are eight or ten in number, and white. After the season is over, the males are said to depart; the females staying behind till the young are able to fly, when the two last go likewise off, but to what part is not certain. It is in greater plenty at Ochotska, especially about the equinox. Fifty or more of the natives go in boats and surround the whole flock, driving them in the flood up the river Ochotska: and, as soon as it ebbs, the whole company fall on them at once with clubs, and often knock so many of them on the head, that each man has 20 or 30 for his share.

6. The *nigra*, or scoter, is totally black, and has a gibbosity at the base of the bill; the tail resembles a wedge; the female is brownish. It is the lesser black diver of Ray, and measures in length 22 inches. These birds are found on the northern coasts of England and those of Scotland in the winter season; but no where so common as on the French coasts, where they are seen in prodigious numbers from November to March, especially if the wind be to the north or north-west. Their chief food is a glossy bivalve shell, near an inch long, called by the French *vaimeaux*. These they are perpetually diving after, frequently to the depth of some fathoms; and an usual method of catching them is by placing nets under the water in such places as the shells are most numerous; by which means 30 or 40 dozen of them have been taken in one tide. The day seems to be spent by these birds between diving and flying to small distances over the water, which it does so low as frequently to dip the legs therein. It swallows the food whole, and soon digests the shells, which are found quite crumbled to powder among the excrements. It has been kept tame for some time, and will feed on soaked bread. The flesh tastes fishy to an extreme; on which account it is allowed by the Roman Catholics to be eaten on fast days and in lent; and indeed must be a sufficient mortification.—These birds abound in all the northern parts of the continent, Lapland, Sweden, Norway, and Russia; and are found in great plenty on the great lakes and rivers of the north and east of Siberia, as well as on the sea-shores. It likewise inhabits North America; being met with at New York; and in all probability much more to the north on that continent and that of Asia, Osbeck having met with them in 30 and 34 degrees south latitude.

Anas. titude, between the island of Java and St Paul, in the month of June.

7. The anser, *ferus et mansuetus*; or grey lag, and tame goose. The *grey lag*, or *wild goose*, is two feet nine inches in length, and five feet in extent. The bill is large and elevated; of a flesh colour, tinged with yellow; the head and neck cinereous; breast and belly whitish, clouded with grey or ash colour; back, grey; the legs of a flesh colour. This species resides in the fens the whole year; breeds there, and hatches about eight or nine young, which are often taken, easily tamed, and esteemed most excellent meat, superior to the domestic goose. Towards winter they collect in great flocks, but in all seasons live and feed in the fens. On the continent they are migratory, changing place in large flocks, often 500 or more: in this case, the flock is triangular in shape, with one point foremost; and as the goose which is first is tired soonest, it has been seen to drop behind, and another to take his place. In very small flocks, however, they are sometimes seen to follow one another in a direct line. Geese seem to be general inhabitants of the globe.

The *mansuetus*, is the grey lag in a state of domestication, and from which it varies in colour, though much less so than either the mallard or cock, being ever more or less verging to grey; though in all cases the whiteness of the vent, and upper tail coverts, is manifest. It is frequently found quite white, especially the males; and doubts have arisen, which of the two colours should have the preference in point of eating.—Tame geese are kept in great multitudes in the fens of Lincolnshire: a single person will have 1000 old geese, each of which will rear seven; so that towards the end of the season he will become possessed of 8000. During the breeding season these birds are lodged in the same houses with the inhabitants, and even in their very bed-chambers: in every apartment are three rows of coarse wicker pens, placed one above another; each bird has its separate lodge divided from the other, which it keeps possession of during the time of sitting. A person called a *gozzard*, i. e. *goose-herd*, attends the flock, and twice a-day drives the whole to water; then brings them back to their habitations, helping those that live in the upper stories to their nests, without ever misplacing a single bird. The geese are plucked five times in the year: the first plucking is at Lady-day, for feathers and quills; and the same is renewed, for feathers only, four times more between that and Michaelmas. The old geese submit quietly to the operation, but the young ones are very noisy and unruly. If the season proves cold, numbers of them die by this barbarous custom. Vast numbers of geese are driven annually to London to supply the markets; among them, all the superannuated geese and ganders, which, by a long course of plucking, prove uncommonly tough and dry.

The goose in general breeds only once in a year; but will frequently have two hatches in a season, if well kept. The time of sitting is about 30 days. They will also produce eggs sufficient for three broods, if they are taken away in succession. It is said to be very long-lived, as we have authority for their arriving at no less than 100 years.

The common price of geese in Wiltshire, is regulated by that of mutton, both being the same by the

pound, without the feathers. The usual weight of a fine goose is 15 or 16 pounds; but it is scarce credible how far this may be increased by cramming them with bean-meal and other fattening diet. The victims destined for this surfeit are by some nailed to the floor by the webs of the feet, which causes no pain, and is meant to prevent the least possibility of action: to which, we are told, the French add the refinement of putting out their eyes; but what end this last piece of barbarity is meant to serve, is hard to conjecture. To what weight they arrive in France is not said; but we have been well informed, that 28 or even 30 pounds is no uncommon thing in England.

8. The *bean goose* is two feet seven inches in length; in extent four feet eleven. The bill, which is the chief distinction between this and the former, is small, much compressed near the end, whitish, and sometimes pale red in the middle, and black at the base and nail: the head and neck are cinereous brown, tinged with ferruginous; breast and belly dirty white, clouded with cinereous; the back of a plain ash colour; feet and legs of a saffron colour; claws black. This species arrives in Lincolnshire in autumn; and is called the *bean-geese* from the likeness of the nail of the bill to a horse-bean. They always light on corn-fields, and feed much on the green wheat. They never breed in the fens; but all disappear in May. They retreat to the sequestered wilds of the north of Europe; in their migration they fly a great height, cackling as they go. They preserve a great regularity in their motions; sometimes forming a straight line; at others, assuming the shape of a wedge, which facilitates their progress, for they cut the air readier in that form than if they flew pell-mell.

9. The erythropus, or laughing-geese of Edwards, is a native of Europe and America. The length of this species is about two feet four, the extent four feet six; the bill is elevated, of a pale yellow colour, with a white ring at the base; the fore-head is white; the breast and belly are of a dirty white, marked with great spots of black; and the legs yellow. These visit the fens and other parts of England during winter, in small flocks; they keep always in marshy places, and never frequent the corn-lands. They disappear in the earliest spring, and none are seen after the middle of March. Linnæus makes this goose the female of the *bernacle*; but Mr Pennant thinks his opinion not well founded.

The *bernacle* (*erythropus mas*, Lin.) is two feet one inch in length, the breadth four feet five inches: the bill is black; the forehead and cheeks are white; from the bill to the eyes, there is a black line; the hind part of the head, the whole neck, and upper part of the breast and back, are of a deep black; the tail is black, the legs are of the same colour, and small. These birds appear in vast flocks during winter, on the north-west coasts of this kingdom: they are very shy and wild; but on being taken, grow in a few days as familiar as our tame geese. In February they quit our shores, and retire as far as Lapland, Greenland, and even Spitzbergen, to breed. They live to a great age: the Rev. Dr Buckworth of Spalding, had one which was kept in the family above 32 years, but was blind during the two last; what its age was when first taken, was unknown.

These are the birds that about 200 years ago were believed

Anas.

Anas. believed to be generated out of wood, or rather a species of shell that is often found sticking to the bottoms of ships, or fragments of them; and were called *tree-geese*. These were also thought by some writers to have been the *chenalopes* of Pliny; they should have said *chenerotes*, for those were the birds which that naturalist said were found in Britain: but as he has scarce left us any description of them, it is difficult to say which species he intended. Mr Pennant imagines it to be the following; which is far inferior in size to the wild-geese, and very delicate food, in both respects suiting his description of the *cheneros*.

10. The race-horse or loggerhead goose, is in length 32 inches, and weighs from 20 to 30 pounds. The bill is three inches long, and of an orange colour: the irides are orange, surrounded with black, and then with orange: the head, neck, and upper parts of the body are of a deep ash-colour; the outer edge of the secondaries white, forming a band of the same on the wing: the under parts of the body dusky down the middle; over the thighs cinereous blue; vent white; quills and tail black: the wings are very short, not reaching to the rump: on the bend of the wing is a yellow knob, half an inch in length: the legs are brownish orange, the webs dusky, and the claws black. These inhabit Falkland Islands, Staaten Land, &c. and were mostly seen in pairs, though sometimes they were observed in large flocks. From the shortness of the wings they were unable to fly; but they made considerable use of them when in the water, on which they seemed as it were to run, at least they swam, with the assistance of the wings used as oars, at an incredible rate, inasmuch that it was a most difficult thing to shoot them while on that element: to catch them, the sailors used to surround a flock with boats, and drive them on shore; where, unable to raise themselves from the ground, they ran very fast, but soon growing tired, and squatting down to rest, were easily overtaken, and knocked on the head. Their flesh was sometimes eaten by the sailors, in defect of that of the bustard goose; but it was not much relished, being rank and fishy, and thought more fit for the hogs, which ate it greedily, and fatted well upon it, boiled.

11. The snow-geese is in length two feet eight inches, and weighs between five and six pounds. The bill is somewhat ferrated at the edges; the upper mandible scarlet, the lower whitish: the general colour of the plumage is snow white, except the first ten quills, which are black, with white shafts: the legs are of a deep red. The young are of a blue colour, till they are a year old. These are very numerous at Hudson's Bay, and called by the natives *Way-way*, and *Wapa whe whe*. They visit Severn River in May, and stay a fortnight; but go farther north to breed: they return to Severn Fort the beginning of September, and stay to the middle of October, when they depart for the south, and are observed to be attended with their young, in flocks innumerable. At this time many thousands are killed by the inhabitants; who pluck them, and take out the entrails, and putting the bodies into holes dug in the ground, cover them with earth, which freezing above them, keeps them perfectly sweet throughout the severe season; during which there is no more to do than occasionally to open one of those storehouses, when they find them sweet and good. They seem to occupy also

the western side of America. In the summer months, they are plenty on the arctic coast of Siberia, but never migrate beyond longitude 130. They are supposed to pass the winter in more moderate climes, as they have been seen flying at a great height over Silesia; probably on their passage to some other country, as it does not appear that they continue there. In like manner, those of America pass the winter in Carolina. Here they arrive in vast flocks; and feed on the roots of sage and grass, which they tear up like hogs. It used to be a common practice in that country to burn a piece of a marsh, which enticed the geese to come there, as they could then more readily get at the roots, which gave the sportsman opportunity of killing as many as he pleased. This species is the most numerous and the most stupid of all the goose race. They seem to want the instinct of others, by their arriving at the mouths of the Arctic Asiatic rivers before the season in which they can possibly subsist. They are annually guilty of the same mistake, and annually compelled to make a new migration to the south in quest of food, where they pass their time till the northern estuaries are freed from the bonds of ice. They have so little of the shyness of other geese, that they are taken in the most ridiculous manner imaginable, about Jakut, and the other parts of Siberia, which they frequent. The inhabitants first place, near the banks of the rivers, a great net, in a straight line, or else form a hovel of skins sewed together. This done, one of the company dresses himself in the skin of a white reindeer, advances towards the flock of geese, and then turns back towards the net or the hovel; and his companions go behind the flock, and by making a noise drive them forward. The simple birds mistake the man in white for their leader, and follow him within reach of the net, which is suddenly pulled down and captivates the whole. When he chooses to conduct them to the hovel, they follow in the same manner; he creeps in at a hole left for that purpose, and out at another on the opposite side, which he closes up. The geese follow him through the first; and as soon as they are got in, he passes round, and secures every one.

12. The great goose is of a very large size, weighing near 25 or 30 Russian pounds. The bill is black; base of it tawny: body dusky: the under parts are white; the legs scarlet. It is found in the east of Siberia, from the river Lena to Kamtschatka; and is taken in great numbers, together with the red-necked goose, in glades, as we do woodcocks in England, but upon a larger scale.

13. The ruficollis, or red-breasted goose, is in length 21 inches; weight three pounds troy. The bill is small, and brown; the tail black: the irides are yellow brown; round the eyes, fringed with brown: fore part of the head and crown black, passing backwards in a narrow stripe quite to the back: on the breast is a narrow band of white feathers with black ends, forming a band of white and another of black: the sides are striped with black: back and wings black, the last even with the tail: legs black. This most elegant of geese is found to breed from the mouth of the Ob, along the coasts of the Icy Sea, to that of the Lena. Its winter quarters are not certainly known. Small flocks are observed in the spring, flying from the Caspian Sea along the Volga northward; and are seen about Zari-

Anas. zyn, between the sixth and tenth of April. They rest a little time on the banks of the Sarpa, but soon resume their arctic course. Their winter retreat is probably in Persia. They are highly esteemed for the table, being quite free from any fishy taste.

14. The casarca, or ruddy goose, is larger than a mallard, and seems even larger than it really is, from the length of wing, and standing high on its legs. The bill is black: the irides are yellowish brown: forehead, cheeks, and throat, yellowish: fore-part of the neck ferruginous, encircled with a collar of black, inclining to deep rufous on the throat: the breast and sides are pale rufous; the belly is obscure: the back is pale; the lower part is undulated, hoary, and brown, not very distinct; the rump and tail are greenish black; the legs long and black. This species is found in all the southern parts of Russia and Siberia in plenty. In winter it migrates into India, and returns northward in spring. It makes the nest in the craggy banks of the Wolga and other rivers, or in the hollows of the deserted hillocks of marmots; making it after the manner of the sheldrake, and is said to form burrows for itself in the manner of that bird. It has been known also to lay in a hollow tree, lining the nest with its own feathers. It is monogamous: the male and female sit in turns. The eggs are like those of the common duck. When the young come forth, the mother will often carry them from the place of hatching to the water with her bill. They have been attempted to be domesticated, by rearing the young under tame ducks; but without success, as they ever are wild, effecting their escape the first opportunity: or if the old ones are taken and confined, they lay the eggs in a dispersed manner, and never sit. The voice is not unlike the note of a clarinet, while flying; at other times they cry like a peacock, especially when kept tame; and now and then cluck like a hen. It is very choice of its mate; for if the male is killed, the female will not leave the gunner till she has been two or three times shot at. The flesh is thought very good food.

15. The bernicla, is of a brown colour; with the head, neck, and breast, black; and a white collar. These birds, like the bernacles, frequent our coasts in winter; and are particularly plenty, at times, on those of Holland and Ireland, where they are taken in nets placed across the rivers. In some seasons they have resorted to the coasts of Picardy, in France, in such prodigious flocks as to prove a pest to the inhabitants, especially in the winter of the year 1740, when these birds destroyed all the corn near the sea-coasts, by tearing it up by the roots. A general war was for this reason declared against them, and carried on in earnest, by knocking them on the head with clubs; but their numbers were so prodigious, that this availed but little: nor were the inhabitants relieved from this scourge till the north wind which had brought them ceased to blow, when they took leave. They easily become tame; and, being fattened, are thought to be a delicate food. They breed pretty far north, returning southward in autumn. They fly in the shape of a wedge, like the wild geese, with great clamour. They are called in Shetland, *Horra geese*, from being found in that sound. They are common also in America: breeding in the islands, and along the coast, and feed about high-water mark. Their food consists of plants, such

as the small bistort, and black-berried heath, sea-worms, berries, and the like. They are apt to have a fishy taste, but are in general thought good food. The same fable has been told of this bird as of the bernacle, in respect to its being bred from trees. Called at Hudson's Bay, *Wetha may pa wew*.

16. The canadensis is brown; its neck and head are black, and the throat is white. It measures three and a half feet in length. It is found during the summer in Hudson's Bay, and parts beyond; also in Greenland; and, in the summer months, in various parts of North America, as far as Carolina. Numbers breed at Hudson's Bay, and lay six or seven eggs; but the major part retire still farther north. Their first appearance in the Bay is from about the middle of April to about the middle of May, when the inhabitants wait for them with impatience, being one of the chief articles for food, and many years kill as far as 3000 or 4000, which are salted and barrelled. Their arrival is the harbinger of spring, and the month is named by the Indians the *goose-moon*. The British send out their servants, as well as Indians, to shoot these birds on their passage. It is in vain to pursue them; they therefore form a row of huts made of boughs, at musket-shot distance from each other, and place them in a line across the vast marshes of the country. Each hovel, or, as they are called, *stand*, is occupied by only a single person. These attend the flight of the birds, and on their approach mimic their cackle so well, that the geese will answer, and wheel, and come nearer the stand. The sportsman keeps motionless, and on his knees, with his gun cocked, the whole time; and never fires till he has seen the eyes of the geese. He fires as they are going from him, then picks up another gun that lies by him, and discharges that. The geese which he has killed he sets upon sticks as if alive, to decoy others; he also makes artificial birds for the same purpose. In a good day (for they fly in very uncertain and unequal numbers) a single Indian will kill 200. Notwithstanding every species of goose has a different call, yet the Indians are admirable in their imitation of every one. In this sport, however, they must be very careful to secrete themselves; for the birds are very shy, and on the least motion fly off directly. On their return south, which is from the middle of August to the middle of October, much havoc is made among them; but these are preserved fresh for winter store, by putting them, feathers and all, into a large hole dug in the ground, and covering them with mould; and these, during the whole time of the frost's lasting, are found perfectly sweet and good. The Indians at Hudson's Bay call them *Apisijskish*. This species is now pretty common, in a tame state, both on the continent and in England; on the great canal of Versailles hundreds are seen mixing with the swans with the greatest cordiality; and the same at Chantilly. In England, likewise, they are thought a great ornament to the pieces of water in many gentlemen's seats, where they are very familiar, and breed freely. The flesh of the young birds is accounted good; and the feathers equal to those of other geese, inasmuch as to prove an article of commerce much in the favour of those places where they are in sufficient numbers.

17. The mollissima, or eider-duck, is double the size of the common duck, has a cylindrical bill, and the

Anas. wax is divided behind, and wrinkled. The feathers, which are very soft and valuable, fall off during incubation. The male is white above, but black below and behind: the female is greenish. This species is found in the Western Isles of Scotland, particularly on Oranfa, Barra, Rona, and Heisker, and on the Farn Isles; but in greater numbers in Norway, Iceland, and Greenland; from whence a vast quantity of the down, known by the name of *eider* or *edder*, which these birds furnish, is annually imported. Its remarkably light, elastic, and warm qualities, make it highly esteemed as a stuffing for coverlets, by such whom age or infirmities render unable to support the weight of common blankets. This down is produced from the breast of the birds in the breeding season. It lays its eggs among the stones or plants near the shore; and prepares a soft bed for them, by plucking the down from its own breast: the natives watch the opportunity, and take away both eggs and nest: the duck lays again, and repeats the plucking of its breast: if she is robbed after that, she will still lay; but the drakes must supply the down, as her stock is now exhausted: but if her eggs are taken a third time, she wholly deserts the place. See *Down*.

These birds are not numerous on the isles; and it is observed that the drakes keep on those most remote from the sitting places. The ducks continue on their nests till you come almost close to them; and when they rise, are very slow fliers. The number of eggs in each nest are from three to five, warmly bedded in the down; of a pale olive colour; and very large, glossy, and smooth. They now and then, however, lay so many as eight; for Van Troil informs us, that no less than 16 have been found in one nest, with two females, who agree remarkably well together.—In America this bird is found as far south as New York, and breeds on the desert isles of New England; but most common every where to the north. They are said to be constant to the same breeding places, and that a pair has been observed to occupy the same nest for 20 years together. They take their young on their backs instantly to sea; then dive, to shake them off and teach them to shift for themselves. It is said, that the males are five years old before they come to their full colour; that they live to a great age, and will at length grow quite grey. Their food is shells, for which they dive to great depths. They are very numerous in the Esquimaux lands, where and in Greenland they are called *mettek*. The natives kill them on the water with darts, striking them the moment they appear after diving; and know the place from their being preceded by the rising of bubbles. The flesh is said to be much valued.

18. The maula, or scaup-duck, is less than the common duck. The bill is broad, flat, and of a greyish blue colour; the head and neck are black, glossed with green; the breast is black; the back, the coverts of the wings, and the scapulars, are finely marked with numerous narrow transverse bars of black and grey; the legs are dusky. Mr Willughby acquaints us, that these birds take their name from feeding on scaup, or broken shell fish; they differ infinitely in colours, so that in a flock of 40 or 50 there are not two alike.

19. The moschata, or Muscovy duck of Ray, has a naked papillous face, and is a native of India.—It is bigger than the wild duck, being in length two feet.

This species is pretty common in a domesticated state in almost every nation; and the breed ought to be encouraged, as there is more flesh on it than on the common duck, and of a very high flavour. The eggs are rounder than those of a duck, and in young birds frequently incline to green. They lay more eggs, and sit oftener, than other ducks. In an unconfined state they make the nest on the stumps of old trees, and perch during the heat of the day on the branches of such as are well clothed with leaves. When kept tame, they are sufficiently docile; and the male will not unfrequently associate and produce a mongrel breed with the common ducks. The name of Muscovy duck was given to them from their exhaling a musky odour, which proceeds from the gland placed on the rump in common with other birds.

20. The clypeata, or shoveler of Ray, has the end of its bill broad, rounded, and furnished with a small hook. It is in length 21 inches; the female a trifle smaller. Both sexes are apt to vary much in colour: the male likewise differs from the female inwardly, having, just above the divarication of the windpipe where it passes into the lungs, an enlargement, or, as it is called by some, a *labyrinth*.—This bird is now and then met with in England, though not in great numbers. It is said to come into France in February, and some of them to stay during the summer. It lays 10 or 12 rufous-coloured eggs, placed on a bed of rushes, in the same places as the summer-teal; and departs in September, at least the major part of them, for it is rare that one is seen in the winter. The chief food is insects, for which it is continually muddling in the water with its bill. It also is said dexterously to catch flies which pass in its way over the water. Shrimps, among other things, have been found in its stomach on dissection. This species is also found in most parts of Germany; throughout the Russian dominions, as far as Kamtschatka; and in North America, in New York and Carolina, during the winter season. With us it is accounted pretty good food.

21. The strepera, or gad-wal, has the wings variegated with black, white, and red. It inhabits England in the winter months, and is also found at the same season in various parts of France and Italy. It migrates as far as Sweden as summer advances, in order to breed; and found throughout Russia and Siberia, except in the eastern part of the last, and Kamtschatka. Being a very quick diver, it is difficult to be shot. It feeds morning and evening only, being hid among the reeds and rushes during the day. The noise it makes is not unlike that of the mallard, but louder. The flesh is good.

22. The clangula, or golden eye of Ray, is variegated with black and white, and the head is interspersed with blackish green feathers: it has a white spot near the mouth; and the eyes are of a shining gold colour. It is not unfrequent on our sea coasts in winter, and appears in small flocks; but passes to the north in spring in order to breed. It inhabits Sweden and Norway during the summer. It is an excellent diver, and feeds on small shells. It is mostly seen in the water, as it is very awkward in walking. It has been attempted to be domesticated, but seems out of its element on land. With difficulty it can be brought to eat any thing but bread; and the feet soon grow injured,

Anas.

jured, inasmuch as at last to hinder it from walking. The flesh is much esteemed, and the birds are often seen in the markets at the proper season. This species is found in America; in winter, as low as New York; in summer, at Hudson's Bay, where it frequents the fresh-water lakes, and makes in hollow trees a round nest of grass lined with feathers from its breast; lays from seven to ten white eggs.

23. The merse, or Ural duck of Pallas, is somewhat bigger than the common teal. The bill is large, broad, very tumid above the nostrils, and bifid in the adult bird, the end marked with diverging striæ; colour blue: the head, and part of the neck, are white; on the crown is a large patch of black: the middle of the neck is black: the fore-parts of the body are a yellowish brown, undulated with black: the back is clouded with acinereous and pale yellow, powdered with brown: the wings are small; the tail longish, wedge-shaped, and black: the legs are brown, on the fore-part bluish, and placed as far back as in the diver genus. This species is not unfrequent in the greater lakes of the Ural mountains, and the rivers Ob and Irtysh. It is not seen on the ground, for from the situation of its legs it is unable to walk: but it swims very well and quick; at which time the tail is immersed in the water as far as the rump, serving by way of rudder, contrary to the common method of a duck's swimming. The nest is formed of reeds, and floats, something like to that of the grebe.

24. The American wigeon (*le canard jensen* of Buffon), is rather bigger than our wigeon. The bill is of a lead-colour; the crown and fore-head of a yellowish white: the hind-part of the head and neck is black and white, speckled: and behind the eye is a black mark, changing in some lights to green: the back and scapulars are of a pale rust-colour, waved with transverse black lines: in the middle of the wing coverts there is a large bed of white: the quills and tail are deep brown: the legs dusky. It inhabits North America, from Carolina to Hudson's Bay; but is no where a common bird. It is called at New York the *Pheasant Duck*. It is more plenty at St Domingo and Cayenne, where it is called *vingeon* or *gingeon*. At Martinico great flocks of them often take short flights from one rice plantation to another, where they make much havoc, particularly during the rainy season. They are said to perch on trees. They feed in company; and have a sentinel on the watch, like some other birds. They are seldom seen during the day, lying hid in places shaded from the sun: but so soon as that luminary disappears, they come forth from their hiding-places to feed; and, during this, make a particular kind of noise, by which the sportsman is directed in his search after them; at other times their note is a kind of soft whistle, which is often imitated in order to decoy them within reach of the gun. They sit in January; and in March the young are seen running about. They lay many eggs. Sometimes these are hatched under hens; in which case, they are, while young, familiar, though when grown up exceedingly quarrelsome with other ducks: their flesh is most excellent, especially such as are brought up tame. They appear upon the coast of Hudson's Bay in May, as soon as the thaws come on, chiefly in pairs: they lay there only from six to eight eggs; and feed on flies and worms in the swamps. They depart

in flocks in autumn. They are known by the name of *Anas. atheikimo asheep*.

25. The acuta, pin-tail, or sea-pheasant of Ray, has a long acuminate tail, black below, with a whiteline on each side of the back part of the head. It is a native of Europe. Mr Hartlib, in the appendix to his *Legacy*, tells us, that these birds are found in great abundance in Connaught in Ireland, in the month of February only; and that they are much esteemed for their delicacy.

26. The glacialis, or long-tailed duck, is inferior in size to the former. The bill is short, black at the tip and base, orange-coloured in the middle: the cheeks are of a pale brown; the hind part of the head, and the neck both before and behind, are white; the breast and back are of a deep chocolate colour; the four middle feathers of the tail are black, and two of them near four inches longer than the others, which are white: the legs dusky. These birds breed in the most northern parts of the world; and only visit our coasts in the severest winters. It breeds in Hudson's Bay and Greenland, among the stones and grass, making its nest, like the eider, with the down of its own breast, which is equal in value to that of the eider, if it could be got in equal quantity; but the species is scarcer. It lays five eggs; swims and dives admirably; and feeds on shell-fish, which it gets in very deep water. It flies irregularly, sometimes showing its back, sometimes its belly. It continues in Greenland the whole year, in unfrozen places: but there are seasons so very severe, as at times to force them towards the south. Those which breed between Lapland and the polar circle, are often driven into Sweden and the neighbourhood of Petersburg: those from the coast of the Icy Sea, as low as lat. 55; but on the setting in of frost, they retire still farther south, unless where some open spots remain in the rivers. They visit the fresh-water lakes in the Orkneys in October, and continue there till April. At sun-set they are seen, in great flocks, returning to and from the bays, where they frequently pass the night, and make such a noise as to be heard some miles in frosty weather.

27. The ferina, pochard, or red-headed wigeon of Ray, has a lead-coloured bill: the head and neck are of a bright gay colour: the breast and part of the back where it joins the neck, are black: the coverts of the wings, the scapulars, back, and sides under the wings, are of a pale grey, elegantly marked with narrow lines of black: the tail consists of twelve short feathers, of a deep grey colour: the legs are lead coloured; and the irides of a bright yellow, tinged with red. The head of the female is of a pale reddish brown. With us, these birds frequent the fens in the winter season, and are brought up to the London markets, sometimes in considerable numbers, where they are known by the name of *Dun Birds*, and are esteemed excellent eating. In winter, they pass pretty far to the south, being found in Egypt, about Cairo. They come into France the end of October in small flocks, from 20 to 40; and are found in Carolina in winter. They feed on small fish and shells. Their flight is rapid and strong; but the flocks form no particular shape in flying.

28. The querquedula, garganey, or first teal of Aldrovandus, has a green spot on the wings, and a white line

Anas. line above the eyes. It frequents the fresh waters of Europe. In many places it is called the *summer-teal*.

29. The creca, or common teal, has a green spot on the wings, and a white line both above and below the eyes. It is of a small size, only 14 inches in length. The teal is frequent in the London markets, along with the wild duck. It is met with in Duddingston-loch, a fresh-water lake within a mile of Edinburgh. In France it stays throughout the year, and makes a nest in April among the rushes, on the edges of ponds; it is composed of the tenderest stalks of them, with the addition of the pith, and a quantity of feathers. The nest is of a large size, and placed in the water, so as to rise and fall with it. The eggs are the size of those of a pigeon, of a dirty white, marked with small hazel spots. It is said to feed on the grass and weeds which grow on the edges of the ponds which it frequents, as well as the seeds of the rushes; it will also eat small fish. The flesh is accounted excellent. It is found to the north as high as Iceland; and is mentioned as inhabiting the Caspian Sea to the south.

30. The *histrionica*, or dusky spotted duck of Edwards, is of a brown colour, variegated with white and blue; it has a double line on the ears and temples; the collar is white, and there is a white streak on the neck. It inhabits from Carolina to Greenland: in the last it frequents, during summer, the rapid rivers, and the most shady parts; nestling on the banks, among the low shrubs. It swims and dives admirably. In winter it seeks the open sea, flies high and swiftly, and is very clamorous. It feeds on shell-fish, spawn, and the larvæ of gnats. Is found in Iceland, and as low as Sandmor. It is common from the lake Baikal to Kamtschatka; and breeds there, as well as every where else, about the most rocky and rapid torrents.

31. The *minuta*, or little white and brown duck of Edwards, is of a greyish colour, with white ears, and the prime feathers of the wings blackish. This and the former, according to Latham, are found both on the old and new continents. On the first, it is seen as far south as the lake Baikal, and from thence to Kamtschatka, particularly up the river Ochotska; also in Iceland, and as low as Sandmor. In America, it is found from Carolina to Newfoundland, and Hudson's Bay; also in Greenland, where it frequents, during summer, bays and rivers, especially near their mouths, and is a very noisy species. It is fond of shady places, and makes the nest on the shore among the shrubs. Its food is small shells, eggs of fishes, and particularly the larvæ of gnats. It swims well, even in the most rapid streams; and dives to admiration: it likewise flies swift, and to a great height: from which circumstances, it is not easily taken. Our late navigators met with it at Aoonalashka. It is pretty frequent in the small rivulets of Hudson's Bay, about 90 miles inland; seldom in large rivers. It lays 10 or more white eggs, like those of the pigeon, on the grass; and the young brood speckled in a very pretty manner. It migrates south in autumn.

32. The *boschas*, common wild-duck of Ray, or mallard; the intermediate tail-feathers of the drake are turned backward, and the bill is strait. It frequents the lakes of different countries, and feeds upon frogs and several sorts of insects.—The wild-ducks pair in the spring; build their nests among rushes near the

water, and lay from 10 to 16 eggs. The female is a very artful bird; and does not always make the nest close to the water, but frequently at a good distance from it; in which case the duck will take the young in its beak or between its legs. It is known sometimes to lay the eggs in a high tree, in a deserted magpie's or crow's nest. At moulting-time, when they cannot fly, they are caught in great numbers. They abound particularly in Lincolnshire, the great magazine of wild-fowl in this kingdom; where prodigious numbers are taken annually in the *Decoys*. Birds with flat bills, that find their food by groping, have three pair of nerves that extend to the end of their bills: these nerves are remarkably conspicuous in the head and bill of the wild-duck, and are larger than those of a goose or any other bird yet known: this is the reason they grope for food more than any other bird whatever.—The common tame species of ducks take their origin from these, and may be traced to it by unerring characters. The drakes, howsoever they vary in colours, always retain the curled feathers of the tail, and both sexes the form of the bill, of the wild kind. Nature sports in the colours of all domestic animals; and for a wise and useful end, That mankind may the more readily distinguish and claim their respective property.

In France this species is not often seen, except in winter; appearing in October, and going north in spring. They are caught in various manners; among the rest, in decoys, as in England; the chief place for which is Picardy, where prodigious numbers are taken, particularly on the river Somme. It is also customary there to wait for the flocks passing over certain known places, and the sportsman, having a wicker cage, containing a quantity of tame birds, lets out one at a time, at a convenient season, which enticing the passengers within gunshot, five or six are often killed at once by an expert marksman. They are now and then taken also by a hook baited with a bit of sheep's lights, which swimming on the water, the bird swallows the bait, and with it the hook. Various other means of catching ducks and geese are peculiar to certain nations; of which one seems worth mentioning from its singularity:—The person wishing to take these, wades into the water up to the chin, and having his head covered with an empty calabash, approaches the place where the ducks are; when they, not regarding an object of this sort, suffer the man freely to mix with the flock; after which he has only to pull them by the legs under the water, one after another, till he is satisfied; returning as unsuspected by the remainder as when he first came among them. This method is frequently put in practice on the river Ganges, using the earthen vessels of the Gentoos instead of the calabashes: these vessels are what the Gentoos boil their rice in, and are called Kutcharee pots (they likewise make a dish for their tables in them, which goes by the same name): after these are once used they look upon them as defiled, and in course throw them into the river as useless; and the duck-takers find them convenient for their purpose, as the ducks, from constantly seeing the vessels float down the stream, look upon them as objects of full as little regard as a calabash. The above, or some such method, is also practised in China as well as in India. The Chinese, however, though they make great use of ducks,

Anas.

ducks, do not prefer the wild sort, being in general extremely fond of tame ones: and it is said that the major part of these are hatched by artificial heat; the eggs, being laid in boxes of sand, are placed on a brick hearth, to which is given a proper heat during the time required for hatching. The ducklings are fed with little craw-fishes and crabs, boiled and cut small, and afterwards mixed with boiled rice; and in about a fortnight shift for themselves, when the Chinese provide them an old stepmother, who leads them where they are to find provender for themselves; being first put on board a sampane or boat, which is destined for their habitation, and from which the whole flock, often to the amount of 300 or 400, go out to feed, and return at command. This method is used nine months out of the twelve, for in the colder months it does not succeed; and is so far from a novelty, that it may be every where seen; but more especially about the time of cutting the rice and gleaning the crop, when the masters of the duck sampanes row up and down the river according to the opportunity of procuring food, which is found in plenty, at the tide of ebb, on the rich plantations, as they are overflowed at high water. It is curious to see how the ducks obey their master; for some thousands, belonging to different boats, will feed at large on the same spot, and on a signal given will follow their leader to their respective sampanes, without a stranger being found among them*.

* *Ofbeck's
Tereen's
Voyage, i.
194 ii.
255.*

is still more extraordinary, if we consider the number of inhabited sampanes on the Tigris, supposed to be no less than 40,000, which are moored in rows close to each other, with a narrow passage at intervals for boats to pass up and down the river. The Tigris, at Canton, is somewhat wider than the Thames at London, and the whole river is there covered in this manner for the extent of at least a mile. See *Cook's last voyage*, iii. 433.

33. The galericulata, or Chinese teal of Edwards, has a hanging crest; and on the hinder part of the back, on both sides, there is a crooked, flat, elevated feather; the crest is green and red; and the back is brown, and spotted with blue; and erect feathers on the back are red and blunt: one edge of the inmost wing-feather, when the wings are shut, is raised over the back, and is red, and like a sickle before. This most singular and elegant species is a native of China and Japan, where it is kept by the inhabitants for the sake of its beauty. It is not near so common in China as many other kinds, or perhaps they are politically held dear to the European purchasers: they are frequently exposed to sale at Canton in cages, and the common price is from six to ten dollars per pair: they are not unfrequently brought into England alive; but require care, as they seem more tender than our species. Attempts have been made to breed them in this country, but without success, though they are familiar enough. The bird is known in Japan by the name of *Kimnodfui*. The English in China give it the name of *mandarin duck*.

34. The sponfa, or summer-duck of Catesby, is a most elegant species. It has a depending green crest, variegated with blue and white; the back is likewise variegated with blue and white; the breast is grey, and spotted with white; and the throat is white. It inhabits Mexico, and some of the West India isles, mi-

N° 17

grating in the summer season as far north as 40 degrees, or a little beyond. It appears at New York early in the spring, and breeds there; making its nest in the decayed hollows of trees, or such as have been made by woodpeckers, and often between the forks of the branches; and when the young are hatched, the mother takes them on her back to the water. The flesh is much esteemed by the Americans. This is the species, the neck of which the natives of Louisiana use to ornament their pipes or calumets of peace with; and at the last-named place it is found throughout the year. These birds are often kept tame in our menageries, and will breed there.

35. The aborea, or black-billed whistling duck of Edwards, is of a reddish brown colour, with a sort of crest on the head; the belly is spotted with black and white. It is a native of America. Sloane informs us, that this duck perches on trees; that it is about 20 inches long from the end of the bill to the point of the tail; and that it makes a kind of whistling noise, from which circumstance it has received its name.

36. The fuligula, or tufted duck of Ray, has a hanging crest, a black body, and the wings and belly spotted with white. This species is found in Europe as far as Norway. In the winter months it is not unfrequent in England; being met with in the markets in that season, and is much esteemed. It is common also throughout the Russian empire, going northward to breed. Is frequent in Kamtschatka. The male disappears during the incubation of the female.

There are 62 other species enumerated by ornithologists; the whole number hitherto described being 98.

ANASARCA, a species of dropsy. See MEDICINE.

ANASSUS, or ANAXUS (anc. geog.), a river in the territory of Venice, (Pliny); now the *Piave*, which rising from the mountains of Tyrol, not far from the borders of Carinthia, runs from north to south, through the territories of Cadorina, Belluno, Feltre, and, after running from west to east, through Trevigi, falls into the Adriatic, 13 miles to the south-east of Venice.

ANASTASIS, a term among ancient physicians, for a rising up to go to stool. It also signifies the passage of any humour, when expelled from one part, and obliged to remove to another.

ANASTASIUS I. emperor of the east, succeeded Zeno in the year 491, and was inaugurated that same year on April the 11th. The Manicheans and Arians were greatly in hopes of being supported by the new emperor; the former because his mother was their friend, and favoured their sect; the latter because the emperor's uncle was of their opinion: but if Anastasius did not persecute them (as we do not find he ever did), yet it does not appear that he supported either of these sects. But in order to maintain the peace of the church, upon which the tranquillity of the state very much depends, he declared, that such bishops or other clergymen who should disturb the public tranquillity, by maintaining with too much heat either side of the question for or against the council of Chalcedon, should be deprived of their benefices. Accordingly the disputes concerning Eutychianism running to a very great height, and Euphemius being deeply concerned

Anas,
I
Anastasi-
us I.

Anastasius. cerned in them, the emperor expelled him from his see, and chose Macedonius in his stead. The hatred which the different parties entertained against one another occasioned often such tumults and seditions at Constantinople, as threatened the life of the emperor himself; who, to keep the people in awe, ordered that the governor of the city should be present at all church-assemblies and public processions. This was so much the more necessary, because these tumults were chiefly occasioned by a kind of doxology or short hymn which used to be sung at divine service. This doxology consisted only of the following words, *αγιος ο Θεος, αγιος ιχυρος, αγιος αθανατος*, that is, "Holy God, holy the powerful, holy the immortal;" for which reason it was called *τρισαγιος*, *Trisagius*, "three times holy;" because the word *holy* was therein three times repeated. The orthodox used to sing that hymn without any addition, or by adding only to it, *αγια τριας, ιλησον ημας*, i. e. "Holy Trinity, have mercy upon us:" But Peter the Fuller, bishop of Antioch, pretended to add these words to it, viz. *ο σωρωθεις δι ημας*, i. e. "who hast been crucified for us;" and as it was supposed that the first holy related to the Father, the second to the Son, the third to the Holy Ghost, the adding these words, *who hast been crucified for us*, seemed to insinuate that the whole consubstantial Trinity had suffered; for which reason the orthodox were resolved not to admit this addition. Anastasius desiring to have those fatal words added to that hymn whenever it should be sung at Constantinople, this occasioned a terrible sedition in the city, as though the very fundamentals of Christianity had been overthrown. Macedonius and his clergy are said to have raised that sedition, which came to such a height that the emperor himself was obliged to come, without his crown on his head, and in a very humble manner, to the Circus, where he declared to the people that he was very willing to quit the imperial throne; but he told them at the same time, that they could not all enjoy the sovereign power, which does not admit of a partnership: and that one person still must govern them if he resigned the crown. This discourse had such a power over the raging multitude, that, as if they had been divinely inspired, they immediately requested the emperor to take up his crown, promising that they would be quiet and obedient for the future. Anastasius is by the Popish writers represented as a great persecutor of the orthodox, because he banished and deprived Euphemius and Macedonius; but they should prove that these two prelates had been unjustly banished, which is a very hard task. As to his civil government, it is confessed that at the beginning of his reign he showed himself a very good prince; he eased the people of a very heavy tax called *Chrysargyrum*, under which they had groaned for a long time; he prohibited the fighting with wild beasts; he raised several buildings; he avoided being involved in dangerous wars as much as lay in his power. Anastasius reigned 27 years three months and three days, or, according to F. Pagi, wanting three days; and died July the 10th, A. C. 518, in the 88th year of his age.

ANASTASIUS, surnamed *Bibliothecarius*, a Roman abbot, library-keeper, of the Vatican, and one of the most learned men of the ninth century, assisted

VOL. I. Part II.

in 869 at the fourth general council, the acts and canons of which he translated from the Greek into Latin. He also composed the lives of several popes, and other works; the best edition of which is that of the Vatican.

ANASTATICA, the ROSE of JERICHO: A genus of the filiculosa order, belonging to the tetradynamia class of plants; and, in the natural method, ranking under the 39th order, *Siliquifæ*. The characters are: The *calyx* is a perianthium consisting of four leaves, and persistent: The *corolla* consists of four cruciform petals: The *stamina* consist of six subulated filaments the length of the calyx; the antheræ are roundish: The *pistillum* has a small bifid germen; the stylus mucronated and oblique; the stigma headed: The *pericarpium* is a short bilocular filicle, retuse, and crowned on the margin with valvulæ twice as long as the partition: The *seeds* are solitary and roundish.—Of this genus there are two.

Species. 1. The *fyriaca*, a native of Syria, is not cultivated or known in Britain. 2. The *hierochuntica* is a native of the sandy parts of Palestine and the Red Sea. It is a low annual plant, dividing into many irregular woody branches near the root. At each joint is placed a single, oblong, hairy leaf; and at the same places come out small single flowers, of a whitish green colour, composed of four leaves placed in the form of a cross. These are succeeded by short wrinkled pods, having four small horns; these open into four cells, in each of which is lodged a single brown seed.—When the seeds of this plant are ripe, the branches will draw up and contract; so that the whole plant forms a kind of ball or globular body, which will expand on laying it a short time in warm water. This property it retains for many years, on which account it is preserved as a curiosity by some people. From this property the monks have given it the name of *Rosa Mariæ*, pretending that the flowers open on the night in which our Saviour was born.

Culture. This plant is propagated by seeds, which should be sown in the beginning of March, in a moderate hot-bed in pots, in which the plants are designed to remain. When they come up, the plants should be thinned, leaving them about six inches asunder, and observing to keep them clear of weeds, which is all the care they require. If the season proves favourable, they will flower in August; but unless the autumn proves warm and dry, they will not perfect their seeds in Britain.

ANASTOMOSIS, in anatomy, the opening of the mouths of vessels, in order to discharge their contained fluids. It is likewise used for the communication of two vessels at their extremities; as the inosculation of a vein with a vein, of an artery with an artery, or of an artery with a vein.

ANASTOMATICS, medicines supposed to have the power of opening the mouths of the vessels, and promoting the circulation; such as deobstruent, cathartic, and sudorific medicines.

ANASTROPHE, in rhetoric and grammar, denotes the inversion of the natural order of the words: such is, *saxa per et scopulos*, for *per saxa et scopulos*.

ANASUS, or **ANISUS** (anc. geog.), now the *Ens*, a river of Germany; which, rising on the borders of

4.P.

the

Anastatica,
Anasus.

Anathema the territory of Saltzburg, then separating Upper Stiria from Upper Austria, and washing the town of Ens, falls, at the distance of a mile below it, into the Danube, in a course from south to north.

ANATHEMA, among ecclesiastical writers, imports whatever is set apart, separated, or divided; but is most usually meant to express the cutting off a person from the privileges of society and communion with the faithful.

The anathema differs from excommunication in the circumstances of being attended with curses and execrations. It was practised in the primitive church against notorious offenders; and the form of that pronounced by Synecius against one Andronicus, is as follows: "Let no church of God be open to Andronicus, but let every sanctuary be shut against him. I admonish both private men and magistrates, to receive him neither under their roof nor to their table; and priests more especially, that they neither converse with him living, nor attend his funeral when dead."

Several councils also have pronounced anathemas against such as they thought corrupted the purity of the faith; and their decisions have been conceived in the following form: *Si quis dixerit, &c. anathema sit.*

There are two kinds of anathemas, the one judiciary and the other abjunctory. The former can only be denounced by a council, a pope, or a bishop; the latter makes a part of the ceremony of abjuration, the convert being obliged to anathematize the heresy he abjures.

ANATHEMA, in heathen antiquity, was an offering Anathoth, or present made to some deity, and hung up in the temple. Whenever a person left off his employment, ^{Anathoth.} it was usual to dedicate the tools to the patron-deity of the trade. Persons too who had escaped from imminent danger, as shipwreck and the like, or had met with any other remarkable instance of good fortune, seldom failed to testify their gratitude by some present of this kind.

ANATHOTH, a hamlet of Palestine, very near Jerusalem (Josephus), about three miles and a half to the north; the ruins of which are still to be seen. It was the birth-place of the prophet Jeremiah, and one of the Levitical towns in the tribe of Benjamin.

ANATIFERA CONCHA, the trivial name of a species of the *lepas*, a testaceous animal. See **LEPAS**.

ANATOCISM, **ANATOCISMUS**, an usurious contract wherein the interests arising from the principal sum are added to the principal itself, and interest exacted upon the whole. The word is originally Greek, but used by Cicero in Latin; whence it is descended into most other languages. It comes from the preposition *ανα*, which in composition signifies *repetition* or *duplication*, and *τοκος*, *usury*. Anatocism is what we properly call *interest upon interest*, or *compound interest*. This is the worst kind of usury, and has been severely condemned by the Roman law, as well as by the common laws of most other countries. See **INTEREST**.

ANATOLIA. See **NATOLIA**.

A N A T O M Y,

THE art of dissecting, or artificially separating and taking to pieces, the different parts of the human body, in order to an exact discovery of their situation, structure, and œconomy.—The word is Greek, *ανατομή*; derived from *ανατεμνω*, to dissect, or separate by cutting.

INTRODUCTION.

§ 1. History of Anatomy.

THIS art seems to have been very ancient; though, for a long time, known only in an imperfect manner.—The first men who lived must have soon acquired some notions of the structure of their own bodies, particularly of the external parts, and of some even of the internal, such as bones, joints, and sinews, which are exposed to the examination of the senses in living bodies.

This rude knowledge must have been gradually improved, by the accidents to which the body is exposed, by the necessities of life, and by the various customs, ceremonies, and superstitions, of different nations. Thus, the observance of bodies killed by violence, attention to wounded men, and to many diseases, the various ways of putting criminals to death, the funeral ceremonies, and a variety of such things, must have shown men every day more and more of themselves; especially as curiosity and self-love would here urge them powerfully to observation and reflection.

The brute-creation having such an affinity to man in outward form, motions, senses, and ways of life; the generation of the species, and the effect of death upon the body, being observed to be so nearly the same in both; the conclusion was not only obvious, but unavoidable, that their bodies were formed nearly upon the same model. And the opportunities of examining the bodies of brutes were so easily procured, indeed so necessarily occurred in the common business of life, that the huntsman in making use of his prey, the priest in sacrificing, the augur in divination, and above all, the butcher, or those who might out of curiosity attend upon his operations, must have been daily adding to the little stock of anatomical knowledge. Accordingly we find, in fact, that the South-sea-islanders, who have been left to their own observation and reasoning, without the assistance of letters, have yet a considerable share of rude or wild anatomical and physiological knowledge. Dr Hunter informs us, that when Omai was in his museum with Mr Banks, though he could not explain himself intelligibly, they plainly saw that he knew the principal parts of the body, and something likewise of their uses; and manifested a great curiosity or desire of having the functions of the internal parts of the body explained to him; particularly the relative functions of the two sexes, which with him seemed to be the most interesting object of the human mind.

We may further imagine, that the philosophers of the

the most early ages, that is, the men of curiosity, observation, experience, and reflection, could not overlook an instance of natural organization, which was so interesting, and at the same time so wonderful, more especially such of them as applied to the study and cure of diseases. We know that physic was a branch of philosophy till the age of Hippocrates.

Thus the art must have been circumstanced in its beginning. We shall next see from the testimony of historians and other writers, how it actually appeared as an art, from the time that writing was introduced among men; how it was improved, and conveyed down to us through a long series of ages.

Civilization, and improvements of every kind, would naturally begin in fertile countries and healthful climates, where there would be leisure for reflection, and an appetite for amusement. Accordingly, writing, and many other useful and ornamental inventions and arts appear to have been cultivated in the eastern parts of Asia long before the earliest times that are treated of by the Greek or other European writers; and that the arts and learning of those eastern people were in subsequent times gradually communicated to adjacent countries, especially by the medium of traffic. The customs, superstitions, and climate of eastern countries, however, appear to have been as unfavourable to practical anatomy as they were inviting to the study of astronomy, geometry, poetry, and all the softer arts of peace.

Animal bodies there run so quickly into nauseous putrefaction, that the early inhabitants must have avoided such offensive employments as anatomical inquiries, like their posterity at this day. And in fact it does not appear, by the writings of the Grecians, or Jews, or Phœnicians, or of other eastern countries, that anatomy was particularly cultivated by any of those eastern nations. In tracing it backwards to its infancy, we cannot go farther into antiquity than the times of the Grecian philosophers. As an art in the state of some cultivation, it may be said to have been brought forth and bred up among them as a branch of natural knowledge.

The æra of philosophy, as it was called, began with Thales the Melesian being declared by a very general consent of the people, the most wise of all the Grecians, 480 years before Christ. The philosophers of his school, which was called the Ionian, cultivated principally natural knowledge. Socrates, the seventh in succession of their great teachers, introduced the study of morals, and was thence said to bring down philosophy from heaven, to make men truly wise and happy.

In the writings of his scholar and successor Plato, we see that the philosophers had carefully considered the human body, both in its organization and functions; and though they had not arrived at the knowledge of the more minute and intricate parts, which required the successive labour and attention of many ages, they had made up very noble and comprehensive ideas of the subject in general. The anatomical descriptions of Xenophon and Plato have had the honour of being quoted by Longinus (§ xxxii.) as specimens of sublime writing; and the extract from Plato is still more remarkable for its containing the rudiments of the circulation of the blood. "The heart (says Plato)

is the centre or knot of the blood-vessels; the spring or fountain of the blood, which is carried impetuously round; the blood is the *pabulum* or food of the flesh; and for the purpose of nourishment, the body is laid out into canals, like those which are drawn through gardens, that the blood may be conveyed, as from a fountain, to every part of the pervious body."

Hippocrates was nearly contemporary with the great philosophers of whom we have been speaking, about 400 years before the Christian æra. He is said to have separated the profession of philosophy and physic, and to have been the first who applied to physic alone as the business of his life. He is likewise generally supposed to be the first who wrote upon anatomy. We know of nothing that was written expressly upon the subject before; and the first anatomical dissection which has been recorded, was made by his friend Democritus of Abdera.

If, however, we read the works of Hippocrates with impartiality, and apply his accounts of the parts to what we now know of the human body, we must allow his descriptions to be imperfect, incorrect, sometimes extravagant, and often unintelligible, that of the bones only excepted. He seems to have studied these with more success than the other parts, and tells us that he had an opportunity of seeing an human skeleton.

From Hippocrates to Galen, who flourished towards the end of the second century, in the decline of the Roman empire, that is, in the space of 600 years, anatomy was greatly improved; the philosophers still considering it as a most curious and interesting branch of natural knowledge, and the physicians as a principal foundation of their art. Both of them, in that interval of time, contributed daily to the common stock, by more accurate and extended observations, and by the lights of improving philosophy.

As these two great men had applied very particularly to the study of animal bodies, they not only made great improvements, especially in physiology, but raised the credit of natural knowledge, and spread it as wide as Alexander's empire.

Few of Aristotle's writings were made public in his lifetime. He affected to say that they would be unintelligible to those who had not heard them explained at his lectures; and, except the use which Theophrastus made of them, they were lost to the public for above 130 years after the death of Theophrastus; and at last came out defective from bad preservation, and corrupted by men, who, without proper qualifications, presumed to correct and to supply what was lost.

From the time of Theophrastus, the study of natural knowledge at Athens was for ever on the decline; and the reputation of the Lycæum and Academy was almost confined to the studies which are subservient to oratory and public speaking.

The other great institution for Grecian education, was at Alexandria in Egypt. The first Ptolemies, both from their love of literature, and to give true and permanent dignity to their empire, and to Alexander's favourite city, set up a grand school in the palace itself, with a museum and a library, which, we may say, has been the most famed in the world. Anatomy, among other sciences, was publicly taught; and the two distinguished anatomists were Erasistratus the pupil and friend of Theophrastus, and Herophilus. Their

voluminous works are all lost; but they are quoted by Galen almost in every page. These professors were probably the first who were authorized to dissect human bodies; a peculiarity which marks strongly the philosophical magnanimity of the first Ptolemy, and fixes a great æra in the history of anatomy. And it was, no doubt, from this particular advantage which the Alexandrians had above all others, that their school not only gained, but for many centuries preserved, the first reputation for medical education. Ammianus Marcellinus, who lived about 650 years after the schools were set up, says, they were so famous in his time, that it was enough to secure credit to any physician, if he could say that he had studied at Alexandria.

Herophilus has been said to have anatomized 700 bodies. We must allow for exaggeration. Nay, it was said, that both he and Erasistratus made it a common practice to open living bodies, that they might discover the more secret springs of life. But this, no doubt, was only a vulgar opinion, rising from the prejudices of mankind; and accordingly, without any good reason, such tales have been told of modern anatomists, and have been believed by the vulgar.

Among the Romans, though it is probable they had physicians and surgeons from the foundation of the city, yet we have no account of any of these applying themselves to anatomy for a very long time. Archagathus was the first Greek physician established in Rome, and he was banished the city on account of the severity of his operations.—Asclepiades, who flourished in Rome 101 years after Archagathus, in the time of Pompey, attained such a high reputation as to be ranked in the same class with Hippocrates. He seemed to have some notion of the air in respiration acting by its weight; and in accounting for digestion, he supposed the food to be no farther changed than by a comminution into extremely small parts, which being distributed to the several parts of the body, is assimilated to the nature of each. One Cassius, commonly thought to be a disciple of Asclepiades, accounted for the right side of the body becoming paralytic on hurting the left side of the brain, in the same manner as has been done by the moderns, viz. from the crossing of the nerves from the right to the left side of the brain.

From the time of Asclepiades to the second century, physicians seem to have been greatly encouraged at Rome; and in the writings of Celsus, Rufus, Pliny, Cælius Aurelianus, and Aræus, we find several anatomical observations, but mostly very superficial and inaccurate. Towards the end of the second century lived Claudius Gallenus Pergamus, whose name is so well known in the medical world. He applied himself particularly to the study of anatomy, and did more in that way than all that went before him. He seems, however, to have been at a great loss for human subjects to operate upon; and therefore his descriptions of the parts are mostly taken from brute animals. His works contain the fullest history of anatomists, and the most complete system of the science, to be met with anywhere before him, or for several centuries after; so that a number of passages in them were reckoned absolutely unintelligible for many ages, until explained by the discoveries of succeeding anatomists.

About the end of the fourth century, Nimesius bishop of Emiffa wrote a treatise on the nature of man,

in which it is said were contained two celebrated modern discoveries; the one, the uses of the bile, boasted of by Sylvius de la Boe; and the other, the circulation of the blood. This last, however, is proved by Dr Friend, in his History of Physic, p. 229. to be falsely ascribed to this author.

The Roman empire beginning now to be oppressed by the barbarians, and sunk in gross superstition, learning of all kinds decreased; and when the empire was totally overwhelmed by those barbarous nations, every appearance of science was almost extinguished in Europe. The only remains of it were among the Arabians in Spain and in Asia.—The Saracens, who came into Spain, destroyed at first all the Greek books which the Vandals had spared: but though their government was in a constant struggle and fluctuation during 800 years before they were driven out, they received a taste for learning from their countrymen of the east; several of their princes encouraged liberal studies; public schools were set up at Cordova, Toledo, and other towns, and translations of the Greeks into the Arabic were universally in the hands of their teachers.

Thus was the learning of the Grecians transferred to the Arabians. But though they had so good a foundation to build upon, this art was never improved while they were masters of the world: for they were satisfied with commenting upon Galen; and seem to have made no dissections of human bodies.

Abdollahiph, who was himself a teacher of anatomy, a man eminent in his time (at and before 1203) for his learning and curiosity; a great traveller, who had been bred at Bagdad, and had seen many of the great cities and principal places for study in the Saracen empire; who had a favourable opinion of original observation, in opposition to book-learning; who boldly corrected some of Galen's errors, and was persuaded that many more might be detected; this man, we say, never made or saw, or seemed to think of a human dissection. He discovered Galen's errors in the osteology, by going to burying-grounds, with his students and others, where he examined and demonstrated the bones; he earnestly recommended that method of study, in preference even to the reading of Galen, and thought that many farther improvements might be made; yet he seemed not to have an idea that a fresh subject might be dissected with that view.

Perhaps the Jewish tenets which the Mahometans adopted about uncleanness and pollution, might prevent their handling dead bodies; or their opinion of what was supposed to pass between an angel and the dead person, might make them think disturbing the dead highly sacrilegious. Such, however, as Arabian learning was, for many ages together there was hardly any other in all the western countries of Europe. It was introduced by the establishment of the Saracens in Spain in 711, and kept its ground till the restoration of learning in the end of the 15th century. The state of anatomy in Europe, in the times of Arabian influence, may be seen by reading a very short system of anatomy drawn up by Mundinus, in the year 1315. It was extracted principally from what the Arabians had preserved of Galen's doctrine; and, rude as it is, in that age, it was judged to be so masterly a performance, that it was ordered by a public decree, that it should be read in all the schools of Italy; and it actually continued

tinued to be almost the only book which was read upon the subject for above 200 years. Cortesius gives him the credit of being the great restorer of anatomy, and the first who dissected human bodies among the moderns.

A general prejudice against dissection, however, prevailed till the 16th century. The emperor Charles V. ordered a consultation to be held by the divines of Salamanca, in order to determine whether or not it was lawful in point of conscience to dissect a dead body. In Muscovy, till very lately, both anatomy and the use of skeletons were forbidden, the first as inhuman, and the latter as subservient to witchcraft.

In the beginning of the 15th century, learning revived considerably in Europe, and particularly physic, by means of copies of the Greek authors brought from the sack of Constantinople; after which the number of anatomists and anatomical books increased to a prodigious degree.—The Europeans becoming thus possessed of the ancient Greek fathers of medicine, were for a long time so much occupied in correcting the copies they could obtain, studying the meaning, and commenting upon them, that they attempted nothing of their own, especially in anatomy.

And here the late Dr Hunter introduces into the annals of this art a genus of the first rate, Leonardo da Vinci, who had been formerly overlooked, because he was of another profession, and because he published nothing upon the subject. He is considered by the Doctor as by far the best anatomist and physiologist of his time; and was certainly the first man we know of who introduced the practice of making anatomical drawings.

Vassare, in his lives of the painters, speaks of Leonardo thus, after telling us that he had composed a book of the anatomy of a horse, for his own study: “He afterwards applied himself with more diligence to the human anatomy; in which study he reciprocally received and communicated assistance to Marc. Antonio della Torre, an excellent philosopher, who then read lectures in Pavia, and wrote upon this subject; and who was the first, as I have heard, who began to illustrate medicine from the doctrine of Galen, and to give true light to anatomy, which till that time had been involved in clouds of darkness and ignorance. In this he availed himself exceedingly of the genius and labour of Leonardo, who made a book of studies, drawn with red chalk, and touched with a pen, with great diligence, of such subjects as he had himself dissected; where he made all the bones, and to those he joined, in their order, all the nerves, and covered them with the muscles. And concerning those, from part to part, he wrote remarks in letters of an ugly form, which are written by the left hand, backwards, and not to be understood but by those who know the method of reading them; for they are not to be read without a looking-glass. Of these papers of the human anatomy, there is a great part in the possession of M. Francesco da Melzo, a Milanese gentleman, who, in the time of Leonardo, was a most beautiful boy, and much beloved by him, as he is now a beautiful and genteel old man, who reads those writings, and carefully preserves them, as precious relics, together with the portrait of Leonardo, of happy memory. It appears impossible that that divine spirit should reason so well upon the arteries, and muscles,

and nerves, and veins; and with such diligence of every thing, &c. &c.”

Those very drawings and the writings are happily found to be preserved in his Majesty's great collection of original drawings, where the Doctor was permitted to examine them; and his sentiments upon the occasion he thus expresses: “I expected to see little more than such designs in anatomy, as might be useful to a painter in his own profession; but I saw, and indeed with astonishment, that Leonardo had been a general and a deep student. When I consider what pains he has taken upon every part of the body, the superiority of his universal genius, his particular excellence in mechanics and hydraulics, and the attention with which such a man would examine and see objects which he was to draw, I am fully persuaded that Leonardo was the best anatomist at that time in the world. We must give the 15th century the credit of Leonardo's anatomical studies, as he was 55 years of age at the close of that century.”

In the beginning of the 16th century, Achillinus and Benedictus, but particularly Berengarius and Massa, followed out the improvement of anatomy in Italy, where they taught it, and published upon the subject. These first improvers made some discoveries from their own dissections: but it is not surprising that they should have been diffident of themselves, and have followed Galen almost blindly, when his authority had been so long established, and when the enthusiasm for Greek authors was rising to such a pitch.

Soon after this, we may say about the year 1540, the great Vesalius appeared. He was studious, laborious, and ambitious. From Brussels, the place of his birth, he went to Louvain, and thence to Paris, where anatomy was not yet making a considerable figure, and then to Louvain to teach; from which place, very fortunately for his reputation, he was called to Italy, where he met with every opportunity that such a genius for anatomy could desire, that is, books, subjects, and excellent draughtsmen. He was equally laborious in reading the ancients, and in dissecting bodies. And in making the comparison, he could not but see, that there was great room for improvement, and that many of Galen's descriptions were erroneous. When he was but a young man, he published a noble system of anatomy, illustrated with a great number of elegant figures.—In this work he found so many occasions of correcting Galen, that his contemporaries, partial to antiquity, and jealous of his reputation, complained that he carried his turn for improvement and criticisms to licentiousness. The spirit of opposition and emulation was presently roused; and Sylvius in France, Columbus, Fallopius, and Eustachius in Italy, who were all in high anatomical reputation about the middle of this 16th century, endeavoured to defend Galen at the expence of Vesalius. In their disputes they made their appeals to the human body: and thus in a few years the art was greatly improved. And Vesalius being detected in the very fault which he condemns in Galen, to wit, describing from the dissections of brutes, and not of the human body, it exposed so fully that blunder of the older anatomists, that in succeeding times there has been little reason for such complaint.—Besides the above, he published several other anatomical treatises. He has been particularly serviceable by imposing

posing names on the muscles, most of which are retained to this day. Formerly they were distinguished by numbers, which were differently applied by almost every author.

In 1561, Gabriel Fallopius, professor of anatomy at Padua, published a treatise of anatomy under the title of *Observationes Anatomicae*. This was designed as a supplement to Vesalius; many of whose descriptions he corrects, though he always makes mention of him in an honourable manner. Fallopius made many great discoveries, and his book is well worth the perusal of every anatomist.

In 1563, Bartholomæus Eustachius published his *Opuscula Anatomica* at Venice, which have ever since been justly admired for the exactness of the descriptions, and the discoveries contained in them. He published afterwards some other pieces, in which there is little of anatomy; but never published the great work he had promised, which was to be adorned with copperplates representing all the parts of the human body. These plates, after lying buried in an old cabinet for upwards of 150 years, were at last discovered and published in the year 1714, by Lancisi the pope's physician; who added a short explicatory text, because Eustachius's own writing could not be found.

From this time the study of anatomy gradually diffused itself over Europe: insomuch that for the last hundred years it has been daily improving by the labour of a number of professed anatomists almost in every country of Europe.

We may form a judgment about the state of anatomy even in Italy, in the beginning of the 17th century, from the information of Cortesius. He had been professor of anatomy at Bologna, and was then professor of medicine at Massana; where, though he had a great desire to improve himself in the art, and to finish a treatise which he had begun on practical anatomy, in 24 years he could twice only procure an opportunity of dissecting a human body, and then it was with difficulties and in hurry; whereas he had expected to have done so, he says, *once every year, according to the custom in the famous academies of Italy*.

In the very end of the 16th century, our great Harvey, as was the custom of the times, went to Italy to study medicine; for Italy was still the favourite seat of the arts: And in the very beginning of the 17th century, soon after Harvey's return to England, his master in anatomy, Fabricius ab Aquapendente, published an account of the valves in the veins, which he had discovered many years before, and no doubt taught in his lectures when Harvey attended them.

This discovery evidently affected the established doctrine of all ages, that the veins carried the blood from the liver to all parts of the body for nourishment. It set Harvey to work upon the use of the heart and vascular systems in animals; and in the course of some years he was so happy as to discover, and to prove beyond all possibility of doubt, the *circulation of the blood*. He taught his new doctrine in his lectures about the year 1616, and printed it in 1628.

It was by far the most important step that has been made in the knowledge of animal bodies in any age. It not only reflected useful lights upon what had been already found out in anatomy, but also pointed out the means of further investigation. And accordingly we

see, that from Harvey to the present time, anatomy has been so much improved, that we may reasonably question if the ancients have been further outdone by the moderns in any other branch of knowledge. From one day to another there has been a constant succession of discoveries, relating either to the structure or functions of our body; and new anatomical processes, both of investigation and demonstration, have been daily invented. Many parts of the body which were not known in Harvey's time have since then been brought to light: and of those which were known, the internal composition and functions remained unexplained; and indeed must have remained unexplicable without the knowledge of the circulation.

Harvey's doctrine at first met with considerable opposition; but in the space of about 20 years it was so generally and so warmly embraced, that it was imagined every thing in physic would be explained. But time and experience have taught us, that we still are, and probably must long continue to be, very ignorant; and that in the study of the human body, and of its diseases, there will always be an extensive field for the exercise of sagacity.

After the discovery and knowledge of the circulation of the blood, the next question would naturally have been about the passage and route of the nutritious part of the food or chyle from the bowels to the blood-vessels: And, by good fortune, in a few years after Harvey had made his discovery, Asellius, an Italian physician, found out the lacteals, or vessels which carry the chyle from the intestines; and printed his account of them, with coloured prints, in the year 1627, the very year before Harvey's book came out.

For a number of years after these two publications, the anatomists in all parts of Europe were daily opening living dogs, either to see the lacteals or to observe the phenomena of the circulation. In making an experiment of this kind, Pecquet in France was fortunate enough to discover the thoracic duct, or common trunk of all the lacteals, which conveys the chyle into the subclavian vein. He printed his discovery in the year 1651. And now the lacteals having been traced from the intestines to the thoracic duct, and that duct having been traced to its termination in a blood-vessel, the passage of the chyle was completely made out.

The same practice of opening living animals furnished occasions of discovering the lymphatic vessels. This good fortune fell to the lot of Rudbec first, a young Swedish anatomist; and then to Thomas Bartholine, a Danish anatomist, who was the first who appeared in print upon the lymphatics. His book came out in the year 1653, that is two years after that of Pecquet. And then it was very evident that they had been seen before by Dr Higmore and others, who had mistaken them for lacteals. But none of the anatomists of those times could make out the origin of the lymphatics, and none of the physiologists could give a satisfactory account of their use.

The circulation of the blood, and the passage of the chyle having been satisfactorily traced out in full grown animals, the anatomists were naturally led next to consider how these animal processes were carried on in the child while in the womb of the mother. Accordingly the male and female organs, the appearances and contents of the pregnant uterus, the incubated egg, and every

every phenomenon which could illustrate generation, became the favourite subject for about 30 years with the principal anatomists of Europe.

Thus it would appear to have been in theory : but Dr Hunter believes, that in fact, as Harvey's master Fabricius laid the foundation for the discovery of the circulation of the blood by teaching him the valves of the veins, and thereby inviting him to consider that subject ; so Fabricius, by his lectures, and by his elegant work *De formato fœtu, et de formatione ovi et pulli*, probably made that likewise a favourite subject with Dr Harvey. But whether he took up the subject of generation in consequence of his discovery of the circulation, or was led to it by his honoured master Fabricius, he spent a great deal of his time in the inquiry ; and published his observations in a book *De generatione animalium*, in the year 1651, that is six years before his death.

In a few years after this, Swammerdam, Van Horn, Steno, and De Graaf, excited great attention to the subject of generation, by their supposed discovery that the females of viviparous animals have ovaria, that is, clusters of eggs in their loins, like oviparous animals ; which, when impregnated by the male, are conveyed into the uterus : so that a child is produced from an egg as well as a chick ; with this difference, that one is hatched within, and the other without, the body of the mother.

Malpighi, a great Italian genius, some time after, made considerable advances upon the subject of generation. He had the good fortune to be the first who used magnifying glasses with address in tracing the first appearances in the formation of animals. He likewise made many other observations and improvements in the minutiae of anatomy by his microscopical labours, and by cultivating comparative anatomy.

This distinguished anatomist gave the first public specimen of his abilities by printing a dissertation on the lungs, *anno* 1661 ; a period so remarkable for the study of nature, that it would be injustice to pass it without particular notice.

At the same time flourished Laurentius Bellinus at Florence, and was the first who introduced mathematical reasoning in physic. In 1662, Simon Pauli published a treatise *De albandis ossibus*. He had long been admired for the white skeletons he prepared ; and at last discovered his method, which was by exposing the bones all winter to the weather.

Johannes Swammerdam of Amsterdam also published some anatomical treatises ; but was most remarkable for his knowledge of preserving the parts of bodies entire for many years, by injecting their vessels. He also published a treatise on respiration ; wherein he mentioned his having figures of all the parts of the body, as big as the life, cut in copper, which he designed to publish, with a complete system of anatomy. These, however, were never made public by Swammerdam ; but, in 1683, Gothofridus Bidloo, professor of anatomy at Leyden, published a work intitled *Anatomia corporis humani*, where all the parts were delineated in very large plates almost as big as the life. Mr Cowper, an English surgeon, bought 300 copies of these figures ; and in 1698, published them, with an English text, quite different from Bidloo's Latin one ; to which were added letters in Bidloo's figures, and some few figures

of Mr Cowper's own. To this work Cowper's name was prefixed, without the least mention of Bidloo, except on purpose to confute him. Bidloo immediately published a very ill-natured pamphlet, called *Gulielmus Cowperus citatus coram tribunali* ; appealing to the Royal Society, how far Cowper ought to be punished as a plagiary of the worst kind, and endeavouring to prove him an ignorant deceitful fellow. Cowper answered him in his own style, in a pamphlet called his *Vindiciæ* ; endeavouring to prove, either that Bidloo did not understand his own tables, or that they were none of his. It was even alledged that those were the tables promised by Swammerdam, and which Bidloo had got from his widow. This, however, appears to have been only an invidious surmise, there being unquestionable evidence that they were really the performance of Bidloo.

Soon after, Isbrandus Diembroeck, professor of anatomy at Utrecht, began to appear as an author. His work contained very little original ; but he was at great pains to collect from others whatever was valuable in their writings, and his system was the common standard among anatomical students for many years.

About the same time, Antonius Liewenhœck of Delft improved considerably on Malpighi's use of microscopes. These two authors took up anatomy where others had dropt it ; and, by this new art, they brought a number of amazing things to light. They discovered the red globules of the blood ; they were enabled to see the actual circulation of the blood in the transparent parts of living animals, and could measure the velocity of its motion ; they discovered that the arteries and veins had no intermediate cells or spongy substance, as Harvey and all the preceding anatomists had supposed, but communicated one with the other by a continuation of the same tube.

Liewenhœck was in great fame likewise for his discovery of the animalcula in the semen. Indeed there was scarcely a part of the body, solid or fluid, which escaped his examination ; and he almost every where found, that what appeared to the naked eye to be rude undigested matter, was in reality a beautiful and regular compound.

After this period, Nuck added to our knowledge of the absorbent system already mentioned, by his injections of the lymphatic glands ; Ruysch, by his description of the valves of the lymphatic vessels ; and Dr Meckel, by his accurate account of the whole system, and by tracing those vessels in many parts where they had not before been described.

Besides these authors, Drs Hunter and Monro have called the attention of the public to this part of anatomy, in their controversy concerning the discovery of the office of the lymphatics.

When the lymphatic vessels were first seen and traced into the thoracic duct, it was natural for anatomists to suspect, that as the lacteals absorbed from the cavity of the intestines, the lymphatics, which are similar in figure and structure, might possibly do the same office with respect to other parts of the body : and accordingly, Dr Glisson, who wrote in 1654, supposes these vessels arose from cavities, and that their use was to absorb ; and Frederic Hoffman has very explicitly laid down the doctrine of the lymphatic vessels being a system of absorbents. But anatomists in general have been of a contrary opinion ; for from experiments, particularly

ticularly such as were made by injections, they have been persuaded that the lymphatic vessels did not arise from cavities, and did not absorb, but were merely continuations from small arteries. The doctrine, therefore, that the lymphatics, like the lacteals, were absorbents, as had been suggested by Glisson and by Hoffman, has been revived by Dr Hunter and Dr Monro, who have controverted the experiments of their predecessors in anatomy, and have endeavoured to prove that the lymphatic vessels are not continued from arteries, but are absorbents.

To this doctrine, however, several objections have been started, particularly by Haller (*Elem. Phys.* l. 24. § 2, 3.); and it has been found, that before the doctrine of the lymphatics being a system of absorbents can be established, it must first be determined whether this system is to be found in other animals besides man and quadrupeds. Mr Hewson claims the merit of having proved the affirmative of this question, by discovering the lymphatic system in birds, fish, and amphibious animals. See *Phil. Trans.* vol. lviii. and lxi. — And latterly, Mr Cruickshank has traced the ramifications of that system in almost every part of the body; and from his dissections figures have been made and lately published to the world. To Mr Sheldon also we are much indebted for his illustration of this system, which promises to give great satisfaction, but of which only a part has been yet published.

The gravid uterus is a subject likewise which has received considerable improvements, particularly relating to one very important discovery, viz. that the internal membrane of the uterus, which Dr Hunter has named *decidua*, constitutes the exterior part of the secundines or after-birth, and separates from the rest of the uterus every time that a woman either bears a child or suffers a miscarriage. This discovery includes another, to wit, that the placenta is partly made up of an excrescence or efflorescence from the uterus itself.

These discoveries are of the utmost consequence, both in the physiological question about the connection between the mother and child, and likewise in explaining the phenomena of births and abortions as well as in regulating obstetrical practice.

The anatomists of this century have improved anatomy, and have made the study of it much more easy, by giving us more correct, as well as more numerous figures. It is amazing to think of what has been done in that time. We have had four large folio books of figures of the bones, viz. Cheselden's, Albinus's, Sue's, and Trew's. Of the muscles, we have had two large folios; one from Cowper, which is elegant; and one from Albinus, which, from the accuracy and labour of the work, we may suppose will never be outdone. Of the blood-vessels we have a large folio from Dr Haller. We have had one upon the nerves from Dr Mackel, and another by Dr Monro junior. We have had Albinus's, Roederer's, Jenty's, and Hunter's works upon the pregnant uterus; Weitbrecht and Leber on the joints and fresh bones; Soemerring on the brain; Zinn on the eye; Cotunnus, Meckel junior, &c. on the ear; Walter on the nerves of the thorax and abdomen; Dr Monro on the *burſæ*, *mucosæ*, &c.

It would be endless to mention the anatomical figures that have been published in this century, of particular and

smaller parts of the body, by Morgagni, Ruſch, Valſalva, Sanctorini, Heister, Vater, Cant, Zimmerman, Waltherus, and others.

Those elegant plates of the brain, however, just published by M. Vicq. d'Azyr, must not pass without notice, especially as they form part of an universal system of anatomy and physiology, both human and comparative, proposed to be executed in the same splendid style. Upon the brain alone 19 folio plates are employed; of which several are coloured. The figures are delineated with accuracy and clearness; but the colouring is rather beautiful than correct. Such parts of this work as may be published, cannot fail to be equally acceptable to the anatomist and the philosopher; but the entire design is apparently too extensive to be accomplished within the period of a single life. In our own country, also, a very great anatomical work is carrying on by Andrew Bell, F. S. A. S. engraver to his Royal Highness the Prince of Wales, with the approbation of Dr Monro, and under the inspection of his very ingenious assistant Mr Fyfe. It is to compose a complete illustration, both general and particular, of the human body, by a selection from the best plates of all the greatest anatomists, as well foreign as of this country, exhibiting the latest discoveries in the science, and accompanied with copious explanations. The whole number of plates mentioned in the Prospectus is 240, of which 152 are already done; all in royal folio.

To the foreign treatises already mentioned may be added those recently published by Sabbatier and Plenck on anatomy in general. Among ourselves, the writings of Keil, Douglas, Cheselden, the first Monro, Winslow, &c. are too well known to need description. The last of these used to be recommended as a standard for the students of anatomy: but it has of late given place to a more accurate and comprehensive system, in three volumes, published by Mr Elliot of Edinburgh, upon a plan approved of by Dr Monro, and executed by Mr Fyfe. Dr Simmons of London has also obliged the world with an excellent system of anatomy; and another work, under the title of "*Elements of Anatomy and the Animal Economy*:" in which the subjects are treated with uncommon elegance and perspicuity.

In the latter part of the last century, anatomy made two great steps, by the invention of injections, and the method of making what we commonly call *preparations*. These two modern arts have really been of infinite use to anatomy; and besides have introduced an elegance into our administrations, which in former times could not have been supposed to be possible. They arose in Holland under Swammerdam and Ruysch, and afterwards in England under Cowper, St André, and others, where they have been greatly improved.

The anatomists of former ages had no other knowledge of the blood-vessels, than what they were able to collect from laborious dissections, and from examining the smaller branches of them, upon some lucky occasion, when they were found more than commonly loaded with red blood. But filling the vascular system with a bright coloured wax, enables us to trace the large vessels with great ease, renders the smaller much more conspicuous, and makes thousands of the very minute ones.

ones visible, which from their delicacy, and the transparency of their natural contents, are otherwise imperceptible.

The modern art of corroding the fleshy parts with a menstruum, and of leaving the moulded wax entire, is so exceedingly useful, and at the same time so ornamental, that it does great honour to the ingenious inventor Dr Nicholls.

The wax-work art of the moderns might deserve notice in any history of anatomy, if the masters in that way had not been so careless in their imitation. Many of the wax-figures are so tawdry, with a show of unnatural colours, and so very incorrect in the circumstances of figure, situation, and the like, that though they strike a vulgar eye with admiration, they must appear ridiculous to an anatomist. But those figures which are cast in wax, plaster, or lead, from the real subject, and which of late years have been frequently made here, are, of course, very correct in all the principal parts, and may be considered as no insignificant acquisition to modern anatomy. The proper, or principal use of this art is, to preserve a very perfect likeness of such subjects as we but seldom can meet with, or cannot well preserve in a natural state; a subject in pregnancy, for example.

The modern improved methods of preserving animal bodies, or parts of them, has been of the greatest service to anatomy; especially in saving the time and labour of the anatomist in the nicer dissections of the small parts of the body. For now, whatever he has prepared with care, he can preserve; and the object is ready to be seen at any time. And in the same manner he can preserve anatomical curiosities, or rarities of every kind; such as, parts that are uncommonly formed; parts that are diseased; the parts of the pregnant uterus and its contents. Large collections of such curiosities, which modern anatomists are striving almost every where to procure, are of infinite service to the art, especially in the hands of teachers. They give students clear ideas about many things which it is very essential to know, and yet which it is impossible that a teacher should be able to show otherwise, were he ever so well supplied with fresh subjects.

§ 2. *View of the Subject in general, and Plan of the following Treatise.*

THE etymology of the word *anatomy*, as above given, implies simply *dissection*; but by this term something more is usually understood.

It is every day made use of to express a knowledge of the human body; and a person who is said to understand anatomy, is supposed to be conversant with the structure and arrangement of the different solid parts of the body.

It is commonly divided into *Anatomy*, properly so called; and *Comparative Anatomy*: the first of these is confined solely to the human body; the latter includes all animals, so far as a knowledge of their structure may tend to perfect our ideas of the human body. See *COMPARATIVE Anatomy*.

The term *anatomy* may also have another and more extensive signification: it may be employed to express not only a knowledge of the structure and disposition of the parts, but likewise of their œconomy and use. Considered in this light, it will seldom fail to excite the cu-

VOL. I. Part II.

riosity of people of taste, as a branch of philosophy; since, if it is pleasing to be acquainted with the structure of the body, it is certainly more so to discover all the springs which give life and motion to the machine, and to observe the admirable mechanism by which so many different functions are executed.

Astronomy and anatomy, as Dr Hunter, after Fontenelle, observes, are the studies which present us with the most striking view of the two greatest attributes of the Supreme Being. The first of these fills the mind with the idea of his immensity, in the largeness, distances, and number of the heavenly bodies; the last, astonishes with his intelligence and art in the variety and delicacy of animal mechanism.

The human body has been commonly enough known by the name of *microcosmus*, or the little world; as if it did not differ so much from the universal system of nature in the symmetry and number of its parts as in their size.

Galen's excellent treatise *De usu partium*, was composed as a prose hymn to the Creator; and abounds with as irresistible proofs of a supreme Cause and governing Providence, as we find in modern physico-theology. And Cicero dwells more on the structure and œconomy of animals than on all the productions of nature besides, when he wants to prove the existence of the gods from the order and beauty of the universe. He there takes a survey of the body of man in a most elegant synopsis of anatomy, and concludes thus: "Quibus rebus expositis, satis docuisse videor, hominis natura, quanto omnes anteciret animantes. Ex quo debet intelligi, nec figuram situmque membrorum, nec ingenii mentisque vim talem effici potuisse fortuna."

The satisfaction of mind which arises from the study of anatomy, and the influence which it must naturally have upon our minds as philosophers, cannot be better conveyed than by the following passage from the same author: "Quæ contuens animus, accepit ab his cognitionem deorum, ex qua oritur pietas: cui conjuncta justitia est, reliquæque virtutes: ex quibus vita beata existit, par et similis deorum, nulla alia re nisi immortalitate, quæ nihil ad bene vivendum pertinet, cedens cœlestibus."

It would be endless to quote the animated passages of this sort which are to be found in the physicians, philosophers, and theologists, who have considered the structure and functions of animals with a view towards the Creator. It is a view which must strike one with a most awful conviction. Who can know and consider the thousand evident proofs of the astonishing art of the Creator, in forming and sustaining an animal body such as ours, without feeling the most pleasant enthusiasm? Can we seriously reflect upon this awful subject, without being almost lost in adoration? without longing for another life after this, in which we may be gratified with the highest enjoyment, which our faculties and nature seem capable of, the seeing and comprehending the whole plan of the Creator, in forming the universe, and in directing all its operations?

But the more immediate purposes of anatomy concern those who are to be the guardians of health, as this study is necessary to lay a foundation for all the branches of medicine.—The more we know of our fabric, the more reason we have to believe, that if our senses were more acute, and our judgment more enlarged,

ged, we should be able to trace many springs of life which are now hidden from us: by the same sagacity we should discover the true causes and nature of diseases; and thereby be enabled to restore the health of many, who are now, from our more confined knowledge, said to labour under incurable disorders. By such an intimate acquaintance with the œconomy of our bodies, we should discover even the seeds of diseases, and destroy them before they had taken root in the constitution.

That anatomy is the very basis of surgery every body allows. It is dissection alone that can teach us, where we may cut the living body with freedom and dispatch; and where we may venture with great circumspection and delicacy; and where we must not, upon any account, attempt it. This informs the *head*, gives dexterity to the *hand*, and familiarizes the *heart* with a sort of necessary inhumanity, the use of cutting-instruments upon our fellow-creatures.

Besides the knowledge of our body, through all the variety of its *structure* and *operations* in a *sound* state, it is by anatomy only that we can arrive at the knowledge of the true nature of most of the diseases which afflict humanity. The symptoms of many disorders are often equivocal; and diseases themselves are thence frequently mistaken, even by sensible, experienced, and attentive physicians. But by anatomical examination after death, we can with certainty find out the mistake, and learn to avoid it in any similar case.

This use of anatomy has been so generally adopted by the moderns, that the cases already published are almost innumerable: Mangetus, Morgagni, indeed many of the best modern writings in physic, are full of them. And if we look among the physicians of the best character, and observe those who have the *art* itself, rather than the *craft* of the profession at heart; we shall find them constantly taking pains to procure leave to examine the bodies of their patients after death.

After having considered the rise and progress of anatomy; the various discoveries that have been made in it, from time to time; the great number of diligent observers who have applied themselves to this art; and the importance of the study, not only for the prevention and cure of diseases, but in furnishing the liveliest proofs of divine wisdom; the following questions seem naturally to arise: For what purpose is there such a variety of parts in the human body? Why such a complication of nice and tender machinery? Why was there not rather a more simple, less delicate, and less expensive frame (A)?

In order to acquire a satisfactory general idea of this subject, and find a solution of all such questions, let us, in our imagination, *make* a man: in other words, let us suppose that the *mind*, or immaterial part, is to be placed in a corporeal fabric, in order to hold a correspondence with other material beings by the intervention of the body; and then consider, *a priori*, what will be wanted for her accommodation. In this inquiry, we shall plainly see the necessity or advantage, and therefore the final cause, of most of the parts which we ac-

tually find in the human body. And if we consider that, in order to answer some of the requisites, human wit and invention would be very insufficient; we need not be surprised if we meet with some parts of the body whose use we cannot yet perceive, and with some operations or functions which we cannot explain. We can see that the whole bears the most striking characters of excelling wisdom and ingenuity: but the imperfect senses and capacity of *man* cannot pretend to reach every part of a machine, which nothing less than the intelligence and power of the *Supreme Being* could contrive and execute.

First, then, the *mind*, the thinking, immaterial agent, must be provided with a place of immediate residence, which shall have all the requisites for the union of spirit and body; accordingly she is provided with the *brain*, where she dwells as governor and superintendant of the whole fabric.

In the next place, as she is to hold a correspondence with all the material beings around her, she must be supplied with organs fitted to receive the different kinds of impressions which they will make. In fact, therefore, we see that she is provided with the organs of sense, as we call them: the eye is adapted to light; the ear to sound; the nose to smell; the mouth to taste; and the skin to touch.

Further: She must be furnished with organs of communication between herself in the brain and those organs of sense, to give her information of all the impressions that are made upon them: and she must have organs between herself in the brain and every other part of the body, fitted to convey her commands and influence over the whole. For these purposes the nerves are actually given. They are chords, which rise from the brain, the immediate residence of the mind, and disperse themselves in branches through all parts of the body. They convey all the different kinds of sensations to the mind, in the brain; and likewise carry out from thence all her commands or influence to the other parts of the body. They are intended to be occasional monitors against all such impressions as might endanger the well-being of the whole, or of any particular part; which vindicates the Creator of all things, in having actually subjected us to those many disagreeable and painful sensations which we are exposed to from a thousand accidents in life.

Moreover, the mind, in this corporeal system, must be endued with the power of moving from place to place, that she may have intercourse with a variety of objects; that she may fly from such as are disagreeable, dangerous, or hurtful, and pursue such as are pleasant or useful to her. And accordingly she is furnished with limbs, and with muscles and tendons, the instruments of motion, which are found in every part of the fabric where motion is necessary.

But to support, to give firmness and shape to the fabric; to keep the softer parts in their proper places; to give fixed points for, and the proper direction to its motions, as well as to protect some of the more important and tender organs from external injuries; there

(A) The following beautiful representation is taken from the late Dr Hunter's *Introductory Lecture in Anatomy*.

there must be some firm prop-work interwoven through the whole. And in fact, for such purposes the bones are given.

The prop-work must not be made into one rigid fabric, for that would prevent motion. Therefore there are a number of bones.

These pieces must all be firmly bound together, to prevent their dislocation. And this end is perfectly well answered by the ligaments.

The extremities of these bony pieces, where they move and rub upon one another, must have smooth and slippery surfaces for easy motion. This is most happily provided for, by the cartilages and mucus of the joints.

The interstices of all these parts must be filled up with some soft and ductile matter, which shall keep them in their places, unite them, and at the same time allow them to move a little upon one another. And these purposes are answered by the cellular membrane or adipose substance.

There must be an outward covering over the whole apparatus, both to give it compactness and to defend it from a thousand injuries; which, in fact, are the very purposes of the skin and other integuments.

Lastly, The mind being formed for society and intercourse with beings of her own kind, she must be endowed with powers of expressing and communicating her thoughts by some sensible marks or signs; which shall be both easy to herself, and admit of great variety: and accordingly she is provided with the organs and faculty of speech, by which she can throw out signs with amazing facility, and vary them without end.

Thus we have built up an animal body which would seem to be pretty complete: but as it is the nature of matter to be altered and worked upon by matter; so in a very little time such a living creature must be destroyed, if there is no provision for repairing the injuries which she must commit upon herself, and those which she must be exposed to from without. Therefore a treasure of blood is actually provided in the heart and vascular system, full of nutritious and healing particles, fluid enough to penetrate into the minutest parts of the animal; impelled by the heart, and conveyed by the arteries, it washes every part, builds up what was broken down, and sweeps away the old and useless materials. Hence we see the necessity or advantage of the heart and arterial system.

What more there was of this blood than enough to repair the present damages of the machine must not be lost, but should be returned again to the heart; and for this purpose the venous system is actually provided. These requisites in the animal explain, *a priori*, the circulation of the blood.

The old materials which were become useless, and are swept off by the current of blood, must be separated and thrown out of the system. Therefore glands, the organs of Secretion, are given for straining whatever is redundant, vapid, or noxious, from the mass of blood; and when strained, they are thrown out by emunctories, called organs of Excretion.

But now, as the machine must be constantly wearing, the reparation must be carried on without intermission, and the strainers must always be employed. Therefore there is actually a perpetual circulation of the blood, and the secretions are always going on.

Even all this provision, however, would not be sufficient; for that store of blood would soon be consumed, and the fabric would break down, if there were not a provision made for fresh supplies. These we observe, in fact, are profusely scattered round her in the animal and vegetable kingdoms; and she is furnished with hands, the fittest instruments that could have been contrived, for gathering them, and for preparing them in a variety of ways for the mouth.

But these supplies, which we call food, must be considerably changed; they must be converted into blood. Therefore she is provided with teeth for cutting and bruising the food, and with a stomach for melting it down: In short, with all the organs subservient to digestion.—The finer parts of the aliments only can be useful in the constitution: these must be taken up and conveyed into the blood, and the dregs must be thrown off. With this view the intestinal canal is actually given. It separates the nutritious part, which we call *chyle*, to be conveyed into the blood by the system of absorbent vessels; and the feces pass downwards, to be conducted out of the body.

Now we have got our animal not only furnished with what is wanted for its immediate existence, but also with the powers of protracting that existence to an indefinite length of time. But its duration, we may presume, must necessarily be limited: for as it is nourished, grows, and is raised up to its full strength and utmost perfection; so it must in time, in common with all material beings, begin to decay, and then hurry on to final ruin. Hence we see the necessity of a scheme for renovation. Accordingly wise Providence, to perpetuate, as well as preserve his work, besides giving a strong appetite for life and self-preservation, has made animals male and female, and given them such organs and passions as will secure the propagation of the species to the end of time.

Thus we see, that by the very imperfect survey which human reason is able to take of this subject, the animal man must necessarily be complex in his corporeal system, and in its operations.

He must have one great and general system, the vascular, branching through the whole for circulation: Another, the nervous, with its appendages the organs of sense, for every kind of feeling: And a third, for the union and connection of all those parts.

Besides these primary and general systems, he requires others which may be more local or confined: One for strength, support, and protection; the bony compages: Another for the requisite motions of the parts among themselves, as well as for moving from place to place; the muscular part of the body: Another to prepare nourishment for the daily recruit of the body; the digestive organs: And one for propagating the species; the organs of generation.

And in taking this general survey of what would appear, *a priori*, to be necessary for adapting an animal to the situations of life, we observe, with great satisfaction, that man is accordingly made of such systems, and for such purposes. He has them all; and he has nothing more except the organs of respiration. Breathing it seemed difficult to account for *a priori*: we only knew it to be in fact essentially and necessary to life. Notwithstanding this, when we saw all the other parts of the body, and their functions, so well accounted

counted for, and so wisely adapted to their several purposes, there could be no doubt that respiration was so likewise: And accordingly, the discoveries of Dr Priestley have lately thrown light upon this function also, as will be shown in its proper place.

Of all the different systems in the human body, the use and necessity are not more apparent, than the wisdom and contrivance which has been exerted in putting them all into the most compact and convenient form: in disposing them so, that they shall mutually receive, and give helps to one another; and that all, or many of the parts, shall not only answer their principal end or purpose, but operate successfully and usefully in a variety of secondary ways.

If we consider the whole animal machine in this light, and compare it with any machine in which human art has exerted its utmost; suppose the best constructed ship that ever was built, we shall be convinced beyond the possibility of doubt, that there are intelligence and power far surpassing what humanity can boast of.

One superiority in the natural machine is peculiarly striking.—In machines of human contrivance or art, there is no internal power, no principle in the machine itself, by which it can alter and accommodate itself to any injury which it may suffer, or make up any injury which admits of repair. But in the natural machine, the animal body, this is most wonderfully provided for, by internal powers in the machine itself; many of which are not more certain and obvious in their effects, than they are above all human comprehension as to the manner and means of their operation. Thus, a wound heals up of itself; a broken bone is made firm again by a callus; a dead part is separated and thrown off; noxious juices are driven out by some of the excretories; a redundancy is removed by some spontaneous bleeding; a bleeding naturally stops of itself; and a great loss of blood, from any cause, is in some measure compensated, by a contracting power in the vascular system, which accommodates the capacity of the vessels to the quantity contained. The stomach gives information when the supplies have been expended; represents, with great exactness, the quantity and the quality of what is wanted in the present state of the machine: and in proportion as she meets with neglect, rises in her demand, urges her petition in a louder tone, and with more forcible arguments. For its protection, an animal body resists heat and cold in a very wonderful manner, and preserves an equal temperature in a burning and in a freezing atmosphere.

A farther excellence and superiority in the natural machine, if possible, still more astonishing, more beyond all human comprehension, than what we have been speaking of, is the following. Besides those internal powers of self-preservation in each individual, when two of them co-operate, or act in concert, they are endued with powers of making other animals or machines like themselves, which again are possessed of the same powers of producing others, and so of multiplying the species without end.

These are powers which mock all human invention or imitation. They are characteristics of the divine Architect.

Having premised this general account of the subject,

we shall next consider the method to be observed in treating it.

The study of the *human* body, as already noticed, is commonly divided into two parts. The first, which is called *Anatomy*, relates to the matter and structure of its parts; the second, called *Physiology* and *Animal economy*, relates to the principles and laws of its internal operations and functions.

As the body is a compound of solids and fluids, *Anatomy* is divided into,

1. The Anatomy of the solids, and
2. The Anatomy of the fluids.

1. The *SOLIDS*, by which we mean all parts of our body, which are not fluid, are generally divided into two classes, viz.

1. The hard solids or bones. This part of anatomy is called *Osteology*; which signifies the doctrine of the bones.
2. The softer solids; which part is called *Sarcology*, viz. the doctrine of flesh.

This division of the solids, we may observe, has probably taken its origin from the vulgar observation, that the body is made of bone and flesh. And as there are many different kinds of what are called soft or fleshy parts, *Sarcology* is subdivided into,

- (1.) *Angiology*, or the doctrine of vessels; by which is commonly understood *blood-vessels*;
- (2.) *Adenology*, of glands;
- (3.) *Neurology*, of nerves;
- (4.) *Myology*, of muscles; and
- (5.) *Splanchnology*, of the viscera or bowels. There is, besides, that part which treats of the organs of sense and of the integuments.

This division of the solids has been here mentioned, rather for the sake of explaining so many words, which are constantly used by anatomists, than for its importance or accuracy. For besides many other objections that might be urged, there are in the body three species of solids, viz. gristle or cartilage, hair, and nails; which are of an intermediate nature between bone and flesh; and therefore cannot so properly be brought into the osteology or the sarcology. The cartilages were classed with the bones, because the greatest number of them are appendages to bones: and for the like reason the hair and the nails were classed with the integuments.

II. The *FLUIDS* of the human body may be divided into three kinds, which Dr Hunter calls the *crude*, the *general* or *perfect*, and the *local* or *secreted fluid*.

1. By the *crude fluid* is meant the chyle, and whatever is absorbed at the surfaces of the body; in other words, what is recently taken into the body, and is not yet mixed with or converted into blood.

2. The *general* or *perfect fluid* is the blood itself; to wit, what is contained in the heart, arteries, and veins, and is going on in the round of circulation.

3. The *local* or *secreted*, are those fluids peculiar to particular parts of the body, which are strained off from the blood, and yet are very different in their properties from the blood. They are commonly called *secretions*; and some are useful, others excrementitious.

In treating of the *Physiology*, it is very difficult to say what plan should be followed; for every method which has been yet proposed, is attended with manifest inconvenience.

convenience. The powers and operations of the machine have such a dependence upon one another, such connections and reciprocal influence, that they cannot well be understood or explained separately. In this sense our body may be compared to a circular chain of powers, in which nothing is first or last, nothing solitary or independent; so that wherever we begin, we find that there is something preceding which we ought to have known. If we begin with the brain and the nerves, for example, we shall find that these cannot ex-

ist, even in idea, without the heart: if we set out with the heart and vascular system, we shall presently be sensible, that the brain and nerves must be supposed: or, should we take up the mouth, and follow the course of the aliment, we should see that the very first organ which presented itself, supposed the existence both of the heart and brain: Wherefore we shall incorporate the Physiology with the Anatomy, by attempting to explain the functions after we have demonstrated the organs.

PART I. OSTEOLOGY.

WE begin with the bones, which may be considered as the great support of the body, tending to give it shape and firmness.—But before we enter into the detail of each particular bone, it will be necessary to describe their composition and connections, and to explain the nature of the different parts which have an immediate relation to them; as the cartilages, ligaments, periosteum, marrow, and synovial glands.

SECT. I. Of the Bones in general, with their Appendages, &c.

Of the composition of the bones.

THE bones are of a firm and hard (B) substance, of a white colour, and perfectly insensible. They are the most compact and solid parts of the body, and serve for the attachment or support of all the other parts.

Three different substances are usually distinguished in them; their exterior or bony part, properly so called; their spongy cells; and their reticular substance. The first of these is formed of many laminæ or plates, composing a firm hard substance.—The spongy or cellular part is so called on account of its resemblance to a sponge, from the little cells which compose it. This substance forms almost the whole of the extremities of cylindrical bones. The reticular part is composed of fibres, which cross each other in different directions. This net-work forms the internal surface of those bones which have cavities.

The flat bones, as those of the head, are composed only of the laminæ and the cellular substance. This last is usually found in the middle of the bone dividing it into two plates, and is there called *diplœe*.

Gagliardi, who pretended to have discovered an infinite number of clavicali (c), or bony processes, which he describes as traversing the laminæ to unite them together, has endeavoured to support this pretended discovery by the analogy of bones to the bark of trees, in which certain woody nails have been remarked; but this opinion seems to be altogether fanciful.

Some writers have supposed, that the bones are formed by layers of the periosteum, which gradually ossify, in the same manner as the timber is formed in trees by the hardening of the white substance that is found between the inner bark and the wood. M. Du-

hamel, who has adopted this opinion, fed different animals with madder and their ordinary food alternately during a certain time; and he asserts, that in dissecting their bones, he constantly observed distinct layers of red and white, which corresponded with the length of time they had lived on madder or their usual aliment. But it has since been proved by Detleff, that M. Duhamel's experiments were inaccurate, and that neither the periosteum nor the cartilages are tinged by the use of madder, which is known to affect the bones only.

We usually consider in a bone, its body and its extremities. The ancients gave the name of *epiphysis* to the body or middle part, and *apophysis* to the extremities. An *apophysis*, or process, as it is more commonly called, is an eminence continued from the body of the bone, whereas an *epiphysis* is at first a sort of an appendage to the bone, by means of an intermediate cartilage. Many *epiphyses*, which appear as distinct bones in the foetus, afterwards become *apophyses*; for they are at length so completely united to the body of the bone as not to be distinguishable from it in the adult state. It is not unusual, however, at the age of 18 and even 20 years, to find the extremities of bones still in the state of *epiphysis*.

The names given to the processes of bones are expressive of their shape, size, or use; thus if a process is large and of a spherical form, it is called *caput*, or *head*; if the head is flattened, it is termed *condyle*. Some processes, from their resemblance to a skiletto, a breast, or the beak of a crow, are called *styloid*, *mastoid*, or *coracoid*: others are styled *ridges* or *spines*. The two processes of the os femoris derive their name of *trochanters* from their use.

A bone has its cavities as well as processes. These cavities either extend quite through its substance, or appear only as depressions. The former are called *foramina* or *holes*, and these foramina are sometimes termed *canals* or *conduits*, according to their form and extent. Of the depressions, some are useful in articulation. These are called *cotylod* when they are deep, as is the case with the os innominatum, where it receives the head of the os femoris; or *glenoid* when they are superficial, as in the scapula, where it receives the os humeri. Of the depressions that are not designed for

(B) Mr Scheele has lately discovered that bones contain the phosphoric acid united with calcareous earth; and that to this combination they owe their firmness.

(c) In his *Anat. ossium nov. invent. illustrat.* he describes four kinds of these clavicali or nails, viz. the perpendicular, oblique, headed, and crooked.

Osteology. for articulation, those which have small apertures are called *sinuses*; others that are large, and not equally surrounded by high brims, are styled *fossæ*; such as are long and narrow, *furrows*; or if broad and superficial without brims, *sinuosities*. Some are called *digital impressions*, from their resemblance to the traces of a finger on soft bodies.

²
**Connection
of the
bones.**

We shall abridge this article, which is exceedingly diffuse in the generality of anatomical books, and will endeavour to describe it with all the clearness it will allow.

The bones composing the skeleton are so constructed, that the end of every bone is perfectly adapted to the extremity of that with which it is connected, and this connection forms what is called their *articulation*.

Articulation is divided into *diarthrosis*, *synarthrosis*, and *amphiarthrosis*, or moveable, immoveable, and mixed articulation. Each of the two first has its subdivisions. Thus the *Diarthrosis*, or moveable articulation, includes, 1. The *enarthrosis*, as it is called, when a large head is admitted into a deep cavity, as in the articulation of the os femoris with the os innominatum. 2. *Arthrodia*, when a round head is articulated with a superficial cavity, as is the case of the os humeri and scapula. 3. *Ginglimus*, or hinge-like articulation, as in the connection of the thigh-bone with the tibia. *Diarthrosis* and *arthrodia* allow of motion to all sides, *synarthrosis* only of flexion and extension.

The *synarthrosis*, or *immovable articulation*, includes, 1. The *suture*, when the two bones are joined into each other, as is the case with the parietal bones. 2. *Gomphosis*, when one bone is fixed into another, in the manner the teeth are placed in their sockets.

The term *amphiarthrosis* is applied to those articulations which partake both of the *synarthrosis* and *diarthrosis*, as is the case with the bones of the vertebræ, which are capable of motion in a certain degree, although they are firmly connected together by intermediate cartilages.

What is called *symphysis*, is the union of two bones into one; as in the lower jaw, for instance, which in the foetus consists of two distinct bones, but becomes one in a more advanced age, by the ossification of the uniting cartilage.

When bones are thus joined by the means of cartilages, the union is styled *synchondrosis*; when by ligaments, *syneurosis*.

³
**Of the
Cartilages.**

Cartilages are white, solid, smooth, and elastic substances, between the hardness of bones and ligaments, and seemingly of a fibrous texture. We are not able to trace any vessels into their substance by injection, nor are they ever found tinged in animals that have been fed with madder.

They may be distinguished into, 1st, Those which are connected with the bones; and, 2dly, Those which belong to other parts of the body. The first serve either to cover the ends and cavities of bones intended for motion, as in the articulations, where by their smoothness they facilitate motions, which the bones alone could not execute with so much freedom; or they serve to unite bones together, as in the *symphysis pubis*, or to lengthen them as in the ribs.

Many of them ossifying as we advance in life, their number is less in the adult than in the foetus, and of

course there are fewer bones in the old than in the young subject.

Of the second class of cartilages, or those belonging to the soft parts, we have instances in the larynx, where we find them useful in the formation of the voice, and for the attachment of muscles.

The periosteum is a fine membrane of a compact cellular texture, reflected from one joint to another, and serving as a common covering to the bones. It has sanguiferous and lymphatic vessels, and is supplied with nerves from the neighbouring parts. It adheres very firmly to their surface, and by its smoothness facilitates the motion of muscles. It likewise supports the vessels that go to be distributed through the substance of the bones, and may serve to strengthen the articulations. At the extremities of bones, where it is found covering a cartilage, it has by some been improperly considered as a distinct membrane, and named *perichondrium*. This, in its use and structure, resembles the periosteum. Where it covers the bones of the skull, it has gotten the name of *pericranium*.

The periosteum is not a production of the dura mater, as the ancients, and after them Havers, imagined; nor are the bones formed by the ossification of this membrane, at least when it is in a sound state, as some late writers have supposed.

The periosteum is deficient in the teeth above the sockets, and in those parts of bones to which ligaments or tendons are attached.

The marrow is a fat oily substance, filling the cavities of bones. In the great cavities of long bones it is of a much firmer consistence than in the cells of their spongy part. In the former it inclines somewhat to a yellowish tinge, and is of the consistence of fat; in the latter it is more fluid, and of a red colour. This difference in colour and consistence is owing to accidental causes; both kinds are of the same nature, and may both be described under the common name of marrow, though some writers give this name only to the fat-like substance, and call the other the medullary juice.

The marrow is contained in a very fine and transparent membrane, which is supplied with a great number of blood-vessels, chiefly from the periosteum. This membrana medullaris adheres to the inner surface of the bones, and furnishes an infinite number of minute bags or vessels for inclosing the marrow, which is likewise supported in the cavities of the bones by the long filaments of their reticular substance.

Besides the vessels from the periosteum, the membrana medullaris is furnished with others, which in the long bones may be seen passing in near the extremities of the bone, and sending off numerous branches that ramify through all the vesicles of this membrane.

The bones, and the cells containing the marrow, are likewise furnished with lymphatics. By their means, the marrow, like the fat, may be taken up in a greater quantity than it is secreted; and hence it is that so little is found in the bones of those who die of lingering diseases.

It is still a matter of controversy, Whether the marrow is sensible or not? We are certainly not able to trace any nerves to it; and from this circumstance, and its analogy to fat, Haller has ventured to consider it as insensible. On the other hand, Duverney asserts, that

that

Osteology. that an injury done to this substance in a living animal was attended with great pain. In this dispute physiologists do not seem to have sufficiently discriminated between the marrow itself and the membranous cells in which it is contained. The former, like the fat, being nothing more than a secreted, and of course an inorganized matter, may with propriety be ranked among the insensible parts, as much as inspissated mucus or any other secreted matter in the body; whereas the membrana medullaris being vascular, though it possesses but an obscure degree of feeling in a sound state, is not perfectly insensible.

The marrow was formerly supposed to be intended for the nourishment and renewal of the bones; but this doctrine is now pretty generally and deservedly exploded. It seems probable that the marrow is to the bones what fat is to the soft parts. They both serve for some important purposes in the animal economy; but their particular use has never yet been clearly ascertained. The marrow, from the transfusion of the oil through the bones of a skeleton, is supposed to diminish their brittleness; and Havers, who has written professedly on the bones, describes the canals by which the marrow is conveyed through every part of their substance, and divides them into longitudinal and transverse ones. He speaks of the first as extending through the whole length of the bone; and of the latter, as the passages by which the longitudinal ones communicate with each other. The similarity of these to the large cancelli in burnt bones, and the transfusion of the oil through the bones of the skeleton, seems to prove that some such passages do actually exist.

6
Synovial
Glands.

The synovial glands are small bodies (D), supposed to be of a glandular structure, and exceedingly vascular, secreting a fluid of a clear mucilaginous nature, which serves to lubricate the joints. They are placed in small cavities in the articulations, so as to be capable of being gently compressed by the motion of the joint, which expresses their juice in proportion to the degree of friction. When the synovia is wanting, or is of too thick a consistence, the joint becomes stiff and incapable of flexion or extension. This is what is termed *anchylosis*.

7
Of the Li-
gaments.

Ligaments are white, glistening, inelastic bands, of a compact substance, more or less broad or thick, and serving to connect the bones together. They are distinguished by different names adapted to their different forms and uses. Those of the joints are called either round or burfal. The round ligaments are white, tendinous, and inelastic. They are strong and flexible, and are found only in the joint of the knee, and in the articulation of the os femoris with the os innominatum. The burfal, or capsular ligaments, surround the whole joint like a purse, and are to be found in the articulations which allow motion every way, as in the articulation of the arm with the scapula.

8
Of the
Bursæ mu-
cosæ.

Of those sacs called *Bursæ mucosæ*, a few were known to former anatomists, but by much the greater number have been since discovered by Dr Monro (E), who observes that they are to be met with in the ex-

tremities of the body only; that many of them are placed entirely on the inner sides of the tendons, between these and the bones. Many others cover not only the inner, but the outer sides of the tendons, or are interposed between the tendons and external parts, as well as between those and the bones.

Some are situated between the tendons and external parts only or chiefly, some between contiguous tendons, or between the tendons or the ligaments and the joints. A few such sacs are observed where the processes of bones play upon the ligaments, or where one bone plays upon another. Where two or more tendons are contiguous, and afterwards separate from each other, we generally find a common bursa divided into branches, with which it communicates; and a few bursæ of contiguous tendons communicate with each other. —Some, in healthy children, communicate with the cavities of the joints; and in many old people he has seen such communications formed by use or worn by friction, independent of disease.

Their proper membrane is thin and transparent, but very dense, and capable of confining air or any other fluid. It is joined to the neighbouring parts by the common cellular substance. Between the bursa and the hard substance of bone a thin layer of cartilage or of tough membrane is very generally interposed. To the cellular substance on the outside of the bursa, the adipose substance is connected; except where the bursa covers a tendon, cartilage, or bone, much exposed to pressure or friction.

In several places a mass of fat, covered with the continuation of the membrane of the bursa, projects into its cavity. The edges of this are divided into fringes.

The inner side of the membrane is smooth, and is extremely slippery from the liquor secreted in it.

The structure of the bursa bears a strong resemblance to the capsular ligaments of the joints. ⁹ **Their** 1. The inner structure layer of the ligament, like that of the bursa, is thin compared with that of the capsular ligaments of the joints. 2. It is connected to the external ligaments by the common cellular substance. 3. Between it and the bones, layers of cartilage or the articular cartilages, are interposed. 4. At the sides of the joints, where it is not subjected to violent pressure and friction, the adipose substance is connected with the cellular membrane. 5. Within the cavities of the joints we observe masses of fat projecting, covered with similar blood-vessels, and with similar fimbriæ hanging from their edges. 6. In the knee the upper part of such a mass of fat forms what has been called the *mucilaginous gland of the joint*, and the under part projects into the bursa behind the ligament which ties the patella to the tibia. 7. The liquor which lubricates the bursa has the same colour, consistence, and properties as that of the joints, and both are affected in the same manner by heat, mineral acids, and ardent spirits. 8. In some places the bursa constantly communicate with the cavities of the joints, in others they generally do so; from which we may infer a sameness of structure.

When we examine the fimbriæ common to the fatty bodies of the joints and bursa, and which have been supposed to be the ducts of glands lodged within the masses

(D) It is now much doubted, however, whether the appearances in the joints, which are usually called glands, are any thing more than assemblages of fat.

(E) See Description of the *Bursæ Mucosæ*, &c.

Osteology. masses of fat, we are not able to discover any glandular appearance within them. And although we observe many vessels dispersed upon the membranes of the fatty bodies and fimbriæ; and that we cannot doubt that these fimbriæ consist of ducts which contain a lubricating liquor, and can even press such a liquor from them; yet their cavities and orifices are so minute, that they are not discoverable even by the assistance of magnifying-glasses. These fimbriæ appear, therefore, to be ducts like those of the urethra, which prepare a mucilaginous liquor without the assistance of any knotty or glandular organ.

Upon the whole, the synovia seems to be furnished by invisible exhalent arteries by the ducts of the fimbriæ, and by oil exuding from the adipose follicles by passages not yet discovered.

10
Of the Ske-
leton.

The word *skeleton*, which by its etymology implies simply a dry preparation, is usually applied to an assemblage of all the bones of an animal united together in their natural order. It is said to be a natural skeleton, when the bones are connected together by their own proper ligaments; and an artificial one, when they are joined by any other substance, as wire, &c.

The skeleton is generally divided into the head, trunk, and extremities. The first division includes the bones of the cranium and face. The bones of the trunk are the spine, ribs, sternum, and bones of the pelvis.

The upper extremity on each side consists of the two bones of the shoulder, viz. the scapula and clavicle; the bone of the arm or os humeri; the bones of the fore-arm, and those of the hand.

The lower extremity on each side of the trunk consists of the thigh-bone and the bones of the leg and foot.

SECT. II. Of the Bones of the Head.

THE head is of a roundish figure, and somewhat oval (F). Its greatest diameter is from the forehead to the occiput; its upper part is called *vertex*, or crown of the head; its anterior or fore-part the face; and the upper part of this *sinciput*, or forehead; its sides the temples; its posterior, or hind-part, the *occiput*; and its inferior part the *basis*.

The bones of the head may be divided into those of the cranium and face.

§ 1. Bones of the Cranium and Face.

THERE are eight bones of the cranium, viz. the coronal bone, or os frontis; the two parietal bones, or ossa bregmatis; the os occipitis; the two temporal bones; the sphenoid bone; and the os ethmoides, or cribriforme.

Of these, only the os occipitis and ossa bregmatis are considered as proper to the cranium; the rest being common both to the cranium and face.

N° 17.

These bones are all harder at their surface than in their middle; and on this account they are divided into two tables, and a middle spongy substance called *diplœe*.

In this, as in all the other bones, we shall consider its figure, structure, processes, depressions, and cavities; and the manner in which it is articulated with the other bones.

The os frontis has some resemblance in shape to the shell of the cockle. Externally it is convex, its concave side being turned towards the brain. This bone, in the places where it is united to the temporal bones, is very thin, and has there no *diplœe*. It is likewise exceedingly thin in that part of the orbit of the eye which is nearest to the nose. Hence it is, that a wound in the eye, by a sword or any other pointed instrument, is sometimes productive of immediate death. In these cases, the sword passing through the weak part of the bone penetrates the brain, and divides the nerves at their origin; or perhaps opens some blood-vessel, the consequences of which are soon fatal.

We observe on the exterior surface of this bone five apophyses or processes, which are easily to be distinguished. One of these is placed at the bottom and narrowest part of the bone, and is called the nasal process, from its supporting the upper end of the bones of the nose. The four others are called angular or orbital processes. They assist to form the orbits, which are the cavities on which the eyes are placed. In each of these orbits there are two processes, one at the interior or great angle, and the other at the exterior or little angle of the orbit. They are called the angular processes. Between these a ridge is extended in form of an arch, and on this the eye-brows are placed. It is called the orbital or superciliary ridge, and in some measure covers and defends the globe of the eye. There is a hole in this for the passage of the frontal vessels and nerves. This arch is interrupted near the nose by a small pit, in which the tendon of the musculus obliquus major of the eye is fixed. From the under part of each superciliary ridge a thin plate runs a considerable way backwards, and has the name of *orbital*; the external and fore-part of this plate forms a sinuosity for lodging the lacrymal gland. Between the orbital plates there is a large discontinuation of the bone, which is filled up by the cribriform part of the os ethmoides.

On examining the inner surface of this bone at its under and middle part, we observe an elevation in form of a ridge, which has been called the *spinous process*; it ascends for some way, dividing the bone into two considerable fossæ, in which the anterior lobes of the brain are placed. To a narrow furrow in this ridge is attached the extremity of the falx, as the membrane is called, which divides the brain into two hemispheres. The furrow becoming gradually wider, is continued to the upper and back part of the bone. It has the falx fixed

(F) The bones of the foetus being perfectly distinct, and the muscles in young persons not acting much, the shape of the head has been supposed to depend much on the management of children when very young. Vesalius, who has remarked the difference in people of different nations, observes for instance, that the head of a Turk is conical, from the early use of the turban; whilst that of an Englishman is flattened by the chin-stay. Some of the latest physiologists suppose, with good reason, that this difference is chiefly owing to certain natural causes with which we are as yet unacquainted.

Osteology. fixed to it, and part of the longitudinal sinus lodged in it. Besides the two fossæ, there are many depressions, which appear like digital impressions, and owe their formation to the prominent circumvolutions of the brain.

In the fœtus, the forehead is composed of two distinct bones; so that in them the sagittal future reaches from the os occipitis to the nose. This bone is almost every where composed of two tables and a diplœ. These two tables separating from each other under the eyes, form two cavities, one on each side of the face, called the frontal sinuses. These sinuses are lined with a soft membrane, called *membrana pituitaria*. In these sinuses a mucus is secreted, which is constantly passing through two small holes into the nostrils, which it serves to moisten.

The os frontis is joined by future to many of the bones of the head, viz. to the parietal maxillary, and temporal bones; to the os ethmoides; os sphenoides; os unguis; and ossa nasi. The future which connects it with the parietal bones is called the *coronal future*.

13
Of the
parietal
bones.

The parietal bones are two in number; they are very thin, and even transparent in some places. The particular figure of each of these bones is that of an irregular square, bordered with indentations through its whole circumference, except at its lower part. It will be easily conceived, that these bones which compose the superior and lateral parts of the cranium, and cover the greatest part of the brain, form a kind of vault. On their inner surface we observe the marks of the vessels of the dura mater; and at their upper edge the groove for the superior longitudinal sinus.

The ossa parietalia are joined to each other by the sagittal future; to the os sphenoides and ossa temporum by the squamous future; to the os occipitis by the lambdoidal future (G), so called from its resemblance to the Greek letter lambda; and to the os frontis by the coronal future.

In the fœtus, the parietal bones are separated from the middle of the divided os frontis by a portion of the cranium then unossified.

14
Of the oc-
cipital
bone.

The occipital bone forms the posterior and inferior parts of the skull; it approaches nearly to the shape of a lozenge, and is indented throughout three parts of its circumference.

There is a considerable hole in the inferior portion of this bone, called the *foramen magnum*, through which the medulla oblongata passes into the spine. The nervi accessorii, and vertebral arteries, likewise pass through it. Behind the condyles are two holes for the passage of cervical veins into the lateral sinuses; and above them are two others for the passage of the eighth pair and accessory nerves out of the head. At the sides, and a little on the anterior part of the foramen magnum, are two processes, called the condyles, one on each side; they are of an oval figure, and are covered with cartilage.

The external surface of this bone has a large transverse arched ridge, under which the bone is very irregular, where it affords attachment to several muscles. On examining its inner surface, we may observe two ridges in form of a cross; one ascending from near the foramen magnum to the top of the bone; the upper

VOL. I. Part II.

Osteology. end of this in which the falx is fixed, is hollow, for lodging the superior longitudinal sinus, and the under end has the third process of the dura mater fixed to it. The other ridge, which runs horizontally, is likewise hollow for containing the lateral sinuses. Four fossæ are formed by the cross, two above and two below. In the former are placed the posterior lobes of the brain, and in the latter the lobes of the cerebellum.

At the basis of the cranium, we observe the cuneiform process (which is the name given to the great apophysis at the fore part of this bone); it serves for the reception of the medulla oblongata.

The os occipitis is of greater strength and thickness than either of the other bones of the head, though irregularly so; at its inferior part, where it is thinnest, it is covered by a great number of muscles.

This bone, from its situation, being more liable to be injured by falls than any other bone of the head, Nature has wisely given it the greatest strength at its upper part, where it is most exposed to danger.

It is joined to the parietal bones by the lambdoidal future, and to the ossa temporum, by the additamentum of the temporal future. It is likewise connected to the os sphenoides by the cuneiform process. It is by means of the os occipitis that the head is united to the trunk, the two condyles of this bone being connected to the superior oblique processes of the first vertebra of the neck.

There are two temporal bones, one on each side.—**15** Of the temporal bones. We may distinguish in them two parts; one of which is called the *squamous* or *scaly part*, and the other *petrosa* from its hardness. This last is shaped like a pyramid.

Each of these divisions affords processes and cavities: externally there are three processes; one anterior, called the zygomatic process; one posterior, called the *mastoid* or *maxillary process*, from its resemblance to a nipple; and one inferior, called the *styloid process*, because it is shaped like a stileto, or dagger.

The cavities are, 1. The meatus auditorius externus. 2. A large fossa which serves for the articulation of the lower jaw; it is before the meatus auditorius, and immediately under the zygomatic process. 3. The stylo-mastoid hole, so called from its situation between the styloid and mastoid processes; it is likewise styled the aquæduct of Fallopius, and affords a passage to the portio dura of the auditory, or seventh pair of nerves. 4. Below, and on the fore part of the last foramen, we observe part of the jugular fossa, in which the beginning of the internal jugular vein is lodged. Anterior and superior to this fossa is the orifice of a foramen, through which passes the carotid artery. This foramen runs first upwards and then forwards, forming a kind of elbow, and terminates at the end of the os petrosum.—At this part of each temporal bone, we may observe the opening of the Eustachian tube, a canal which passes from the ear to the back part of the nose.

In examining the internal surface of these bones, we may remark the triangular figure of their petrous part which separates two fossæ; one superior and anterior; the other inferior and posterior: the latter of these composes part of the fossa, in which the cerebellum is placed;

4 R

(G) The lambdoidal future is sometimes very irregular, being composed of many small futures, which surround so many little bones called *ossa triquetra*, though perhaps improperly, as they are not always triangular.

Osteology. placed; and the former, a portion of the least fossa for the basis of the brain. On the posterior side of the pars petrosa, we observe the meatus auditorius internus, into which enters the double nerve of the seventh pair. On the under side of this process, part of a hole appears, which is common to the temporal and occipital bones; through it the lateral sinus, the eighth pair, and accessory nerves, pass out of the head.

The pars petrosa contains several little bones called the bones of the ear; which, as they do not enter into the formation of the cranium, shall be described when we are treating of the organs of hearing.

The ossa temporum are joined to the ossa malarum, by the zygomatic sutures; to the parietal bones, by the squamous sutures; to the os occipitis, by the lambdoidal suture; and to the sphenoid bone, by the suture of that name.

¹⁶ **Of the os sphenoides.** This bone, from its situation amidst the other bones of the head, has been sometimes called *cuneiforme*. It is of a very irregular figure, and has been compared to a bat with its wings extended.

It is commonly divided into its middle part or body, and its sides or wings.

The fore part of the body has a spine or ridge, which makes part of the septum narium. The upper part of each wing forms a share of the temple. The fore part of this belongs to the orbit; while the under and back part, termed *spinous process*, is lodged in the base of the skull at the point of the pars petrosa. But two of the most remarkable processes are the pterygoid or aliform, one on each side of the body of the bone, and at no great distance from it. Each of these processes is divided into two wings, and of these the exterior one is the widest. The other terminates in a hook-like process.

The internal surface of this bone affords three fossæ. Two of these are formed by the wings of the bone, and make part of the lesser fossæ of the basis of the cranium. The third, which is smaller, is on the top of the body of the bone; and is called *sella turcica*, from its resemblance to a Turkish saddle. This fossa, in which the pituitary gland is placed, has posteriorly and anteriorly processes called the *clinoid processes*.

There are twelve holes in this bone, viz. six on each side. The first is the passage of the optic nerve and ocular artery; the second, or large slit, transmits the third, fourth, sixth, and first part of the fifth pair of nerves with the ocular vein; the third hole gives passage to the second branch of the fifth pair; and the fourth hole to the third branch of the fifth pair of nerves. The fifth hole is the passage of the artery of the dura mater. The sixth hole is situated above the pterygoid process of the sphenoid bone: through it a reflected branch of the second part of the fifth pair passes.

Within the substance of the os sphenoides there are two sinuses separated by a bony plate. They are lined with the pituitary membrane; and, like the frontal sinuses, separate a mucus which passes into the nostrils.

The os sphenoides is joined to all the bones of the cranium; and likewise to the ossa maxillaria, ossa malarum, ossa palati, and vomer.

This bone makes part of the basis of the skull, assists in forming the orbits, and affords attachment to several muscles.

The os ethmoides is situated at the fore part of the basis of the cranium, and is of a very irregular figure.

From the great number of holes with which it is pierced, **Osteology.** it is sometimes called *os cribriforme* or sieve-like bone.

It consists of a middle part and two sides. The middle part is formed of a thin bony plate, in which ¹⁷ are an infinite number of holes that afford a passage to the filaments of the olfactory nerve. From the middle of this plate, both on the outside and from within, there rises up a process, which may be easily distinguished. The inner one is called *crista galli*, from its supposed resemblance to a cock's comb. To this process the falx of the dura mater is attached. The exterior process, which has the same common basis as the crista galli, is a fine lamella which is united to the vomer; and divides the cavity of the nostrils, though unequally, it being generally a little inclined to one side.

The lateral parts of this bone are composed of a cellular substance; and these cells are so very intricate, that their figure or number cannot be described. Many writers have on this account called this part of the bone the *labyrinth*. These cells are externally covered with a very thin bony lamella. This part of the bone is called the *os planum*, and forms part of the orbit.

The different cells of this bone, which are numerous, and which are every where lined with the pituitary membrane, evidently serve to enlarge the cavity of the nose, in which the organ of smelling resides.

This bone is joined to the os sphenoides, os frontis, ossa maxillaria, ossa palati, ossa nasi, ossa unguis, and vomer.

The ancients, who considered the brain as the seat of all the humours, imagined that this viscus discharged its redundant moisture through the holes of the ethmoid bone. And the vulgar still think, that abscesses of the brain discharge themselves through the mouth and ears, and that snuff is liable to get into the head; but neither snuff nor the matter of an abscess are more capable of passing through the cribriform bone, than the serosity which they supposed was discharged through it in a common cold. — All the holes of the ethmoid bone are filled up with the branches of the olfactory nerve. Its inner part is likewise covered with the dura mater, and its cells are every where lined with the pituitary membrane; so that neither matter nor any other fluid can possibly pass through this bone either externally or internally. Matter is indeed sometimes discharged through the nostrils; but the seat of the disease is in the sinuses of the nose, and not in the brain; and imposthumations are observed to take place in the ear, which suppurate and discharge themselves externally.

Before we leave the bones of the head, we wish to make some general observations on its structure and figure. — As the cranium might have been composed of a single bone, the articulation of its several bones being absolutely without motion, it may be asked perhaps, Why such a multiplicity of bones, and so great number of sutures? Many advantages may possibly arise from this plurality of bones and sutures, which may not yet have been observed. We are able, however, to point out many useful ends, which could only be accomplished by this peculiarity of structure — In this, as in all the other works of nature, the great wisdom of the Creator is evinced, and cannot fail to excite our admiration and gratitude.

The cranium, by being divided into several bones, grows much faster and with greater facility, than if it

was

Osteology. was composed of one piece only. In the foetus, the bones, as we have before observed, are perfectly distinct from each other. The ossification begins in the middle of each bone, and proceeds gradually to the circumference. Hence the ossification, and of course the increase of the head, is carried on from an infinite number of points at the same time, and the bones consequently approach each other in the same proportion. To illustrate this doctrine more clearly, if it can want further illustration, suppose it necessary for the parietal bones, which compose the upper part of the head, to extend their ossification, and form the fore part of the head likewise.—Is it not evident, that this process would be much more tedious than it is now, when the os frontis and the parietal bones are both growing at the same time? Hence it happens, that the heads of young people, in which the bones begin to touch each other, increase slowly; and that the proportionate increase of the volume of the head is greater in three months in the foetus, than it is perhaps in twenty-four months at the age of fourteen or fifteen years.

The sutures, exclusive of their advantages in suspending the processes of the dura mater, are evidently of great utility in preventing the too great extent of fractures of the skull.—Suppose, for instance, that by a fall or blow, one of the bones of the cranium becomes fractured. The fissure, which in a head composed of only one bone, would be liable to extend itself through the whole of it, is checked, and sometimes perhaps stopped by the first suture it meets, and the effects of the injury are confined to the bone on which the blow was received. Ruysch, indeed, and some others, will not allow the sutures to be of any such use; but cases have been met with where they seemed to have had this effect, and in young subjects their utility in this respect must be still more obvious.

The spherical shape of the head seems likewise to render it more capable of resisting external violence than any other shape would do. In a vault, the parts mutually support and strengthen each other, and this happens in the cranium.

§ 2. Proper Bones of the Face.

18
Of the
bones of
the face.

THE face, which consists of a great number of bones, is commonly divided into the upper and lower jaws. The upper jaw consists of thirteen bones, exclusive of the teeth. Of these, six are placed on each side of the maxilla superior, and one in the middle.

The bones, which are in pairs, are the ossa malarum, ossa maxillaria, ossa nasi, ossa unguis, ossa palati, and ossa spongiosa inferiora. The single bone is the vomer.

19
Of the ossa
malarum.

These are the prominent square bones which are placed under the eyes, forming part of the orbits and the upper part of the cheeks. Each of them affords three surfaces; one exterior and a little convex; a second superior and concave, forming the inferior part and sides of the orbit; and a third posterior, irregular, and hollowed for the lodgement of the lower part of the temporal muscle.

The angles of each bone form four processes, two of which may be called *orbital processes*; of these the upper one is joined by suture to the os frontis, and that below to the maxillary bone. The third is connected with the os sphenoides by means of the trans-

verse suture; and the fourth is joined to the zygomatic process of the temporal bone, with which it forms the zygoma.

These bones, which are of a very irregular figure, are so called because they form the most considerable portion of the upper jaw. They are two in number, and generally remain distinct through life.

Of the many processes which are to be seen on these bones, and which are connected with the bones of the face and skull, we shall describe only the most remarkable.

One of these processes is at the upper and fore part of the bone, making part of the side of the nose, and called the *nasal process*. Another forms a kind of circular sweep at the inferior part of the bone, in which are the alveoli or sockets for the teeth: this is called the *alveolar process*. A third process is united to the os maxilla on each side. Between this and the nasal process there is a thin plate, which forms a share of the orbit, and lies over a passage for the superior maxillary vessels and nerves.—The alveolar process has posteriorly a considerable tuberosity on its internal surface, called the *maxillary tuberosity*.

Behind the alveolar process we observe two horizontal lamellae, which, uniting together, form part of the roof of the mouth, and divide it from the nose. The hollowness of the roof of the mouth is owing to this partition's being seated somewhat higher than the alveolar process.—At the fore part of the horizontal lamellae there is a hole called *foramen incisivum*, through which small blood-vessels and nerves go between the mouth and nose.

In viewing these bones internally, we observe a fossa in the inferior portion of the nasal process, which, with the os unguis and os spongiosum inferius, forms a passage for the lachrymal duct.

Where these two bones are united to each other, they project somewhat upwards and forwards, leaving between them a furrow, into which the lower portion of the septum nasi is admitted.

Each of these bones being hollow, a considerable sinus is formed under its orbital part. This cavity, which is usually named after Highmore, though it was described by Fallopius and others before his time, is lined with the pituitary membrane. It is intended for the same purposes as the other sinuses of the nose, and opens into the nostrils.

The ossa maxillaria are connected with the greater part of the bones of the face and cranium, and assist in forming not only the cheeks, but likewise the palate, nose, and orbits.

The ossa nasi form two irregular squares. They are thicker and narrower above than below. Externally they are somewhat convex, and internally slightly concave. These bones constitute the upper part of the nose. At their fore part they are united to each other, above to the os frontis, by their sides to the ossa maxillaria superiora, posteriorly and interiorly to the septum narium, and below to the cartilages that compose the rest of the nostrils.

These little transparent bones owe their name to their supposed resemblance to a finger-nail. Sometimes they are called *ossa lachrymalia*, from their concurring with the nasal process of each maxillary bone in forming a lodgement for the lachrymal sac and duct.

Osteology.

The ossa unguis are of an irregular figure. Their external surface consists of two smooth parts, divided by a middle ridge. One of these parts, which is concave and nearest to the nose, serves to support the lachrymal sac and part of the lachrymal duct. The other, which is flat, forms a small part of the orbit.

Each of these bones is connected with the os frontis, os ethmoides, and os maxillare superius.

23
Of the ossa palati.

These bones, which are situated at the back part of the roof of the mouth, between the os sphenoides and the ossa maxillaria superiora, are of a very irregular shape, and serve to form the nasal and maxillary fossa, and a small portion of the orbit. Where they are united to each other, they rise up into a spine on their internal surface. This spine appears to be a continuation of that of the superior maxillary bones, and helps to form the septum narium.

These bones are joined to the ossa maxillaria superiora, os ethmoides, os sphenoides, and vomer.

24
Of the vomer.

This bone derives its name from its resemblance to a ploughshare. It is a long and flat bone, somewhat thicker at its back than at its fore part. At its upper part we observe a furrow extending through its whole length. The posterior and largest part of this furrow receives a process of the sphenoid bone. From this the furrow advances forwards, and becoming narrower and shallower, receives some part of the nasal lamella ethmoidea; the rest serves to support the middle cartilage of the nose.

The inferior portion of this bone is placed on the nasal spine of the maxillary and palate bones, which we mentioned in our description of the ossa palati.

The vomer is united to the os sphenoides, os ethmoides, ossa maxillaria superiora, and ossa palati. It forms part of the septum narium, by dividing the back part of the nose into two nostrils.

25
Of the ossa sphenoida inferiora.

The parts which are usually described by this name, do not seem to deserve to be distinguished as distinct bones, except in young subjects. They consist of a spongy lamella in each nostril, which is united to the spongy lamina of the ethmoid bone, of which they are by some considered as a part.

Each of these lamellæ is longest from behind forwards; with its convex surface turned towards the septum narium, and its concave part towards the maxillary bone, covering the opening of the lachrymal duct into the nose.

These bones are covered with the pituitary membrane; and, besides their connection with the ethmoid bone, are joined to the ossa maxillaria superiora, ossa palati, and ossa unguis.

26
Of the maxilla inferior.

The maxilla inferior, or lower jaw, which in its shape resembles a horse-shoe, consists of two distinct bones in the fœtus; but these unite together soon after birth, so as to form only one bone. The upper edge of this bone, like the os maxillare superius, has an alveolar process, furnished with sockets for the teeth.

On each side the posterior part of the bone rises almost perpendicularly into two processes. The highest of these, called the coronoid process, is pointed and thin, and serves for the insertion of the temporal muscle. The other, or condyloid process as it is called, is shorter and thicker, and ends in an oblong rounded head, which is received into a fossa of the temporal bone, and is formed for a moveable articulation with

the cranium. This joint is furnished with a moveable cartilage. At the bottom of each coronoid process, on its inner part, we observe a foramen extending under the roots of all the teeth, and terminating at the outer surface of the bone near the chin. Each of these canals transmits an artery, vein, and nerve, from which branches are sent off to the teeth.

The lower jaw is capable of a great variety of motion. By sliding the condyles from the cavity towards the eminences on each side, we bring it horizontally forwards, as in biting; or we may bring the condyles only forward, and tilt the rest of the jaw backward, as in opening the mouth. We are likewise able to slide the condyles alternately backwards and forwards from the cavity to the eminence, and *vice versa*, as in grinding the teeth. The cartilages, by adapting themselves to the different inequalities in these several motions of the jaw, serve to secure the articulation, and to prevent any injuries from friction.

The alveolar processes are composed of an outer and inner bony plate, united together by thin partitions, which at the fore part of the jaw divide the processes into as many sockets as there are teeth. But at the back part of the jaw, where the teeth have more than one root, we find a distinct cell for each root. In both jaws these processes begin to be formed with the teeth; they likewise accompany them in their growth, and gradually disappear when the teeth are removed.

§ 3. Of the Teeth.

THE teeth are bones of a particular structure, formed for the purposes of mastication and the articulation of the voice. It will be necessary to consider their composition and figure, their number and arrangement, and the time and order in which they appear.

In each tooth we may distinguish a body, a neck, and a root or fangs.

The body of the tooth is that part which appears above the gums. The root is fixed into the socket, and the neck is the middle part between the two.

The teeth are composed of two substances, viz. enamel and bone. The enamel, or the vitreous or cortical part of the tooth, is a white and very hard and compact substance peculiar to the teeth, and appears fibrous or striated when broken. This substance is thickest on the grinding surface, and becoming gradually thinner, terminates insensibly at the neck of the tooth. Ruysch* affirmed, that he could trace the arteries into the hardest part of the teeth; Liewenhoeck† suspected the fibres of the enamel to be so many vessels; and Monro‡ says, he has frequently injected the vessels of the teeth in children, so as to make the inside of the cortex appear perfectly red. But it is certain, that it is not tinged by a madder diet, and that no injection will ever reach it, so that it has no appearance of being vascular ||.

The bony part, which composes the inner substance of the body, neck, and root of the tooth, resembles other bones in its structure, but it is much harder than the most compact part of bones in general. As a tooth when once formed receives no tinge from a madder diet, and as the minutest injections do not penetrate into its substance, this part of a tooth has, like the enamel, been supposed not to be vascular. But when we consider that the fangs of a tooth are invested

27

Of the teeth.

* The four.

† Arcan.

‡ Natur. con-

tinuat. E-

pistol.

§ Anat. of

the Human

Bones.

|| Hunter on

the Teeth.

Osteology by a periosteum, and that the swellings of these fangs are analogous to the swellings of other bones, we may reasonably conclude, that there is a similarity of structure; and that this bony part has a circulation through its substance, although from its hardness we are unable to demonstrate its vessels.

In each tooth we find an inner cavity, into which enter an artery, vein, and nerve. This cavity begins by a small opening, and becoming larger, terminates in the body of the tooth. In advanced life this hole sometimes closes, and the tooth is of course rendered insensible.

The periosteum surrounds the teeth from their fangs to a little beyond their bony sockets, where we find it adhering to the gums. This membrane, while it incloses the teeth, serves at the same time to line the sockets, so that it may be considered as common to both.

The teeth are likewise secured in their sockets by means of the gums; a red, vascular, firm, and elastic substance, that possesses but little sensibility. In the gums of infants we find a hard ridge extending through their whole length, but no such ridge is to be seen in old people who have lost their teeth.

The number of the teeth in both jaws at full maturity, usually varies from twenty-eight to thirty-two. They are commonly divided into three classes, viz. incisores, canini, and grinders or molares (H). The incisores are the four teeth in the fore part of each jaw. They have each of them two surfaces; one anterior and convex, the other posterior and slightly concave, both of which terminate in a sharp edge. They are called *incisores* from their use in dividing the food. They are usually broader and thicker in the upper than in the under jaw; and, by being placed somewhat obliquely, generally fall over the latter.

The canini derive their name from their resemblance to a dog's tusks, being the longest of all the teeth. We find one on each side of the incisores, so that there are two canini in each jaw. Their fang resembles that of the incisores, but is much larger; and in their shape they appear like an incisor with its edge worn off, so as to terminate in a narrow point.

These teeth not being calculated for cutting and dividing the food like the incisores, or for grinding it like the molares, seem to be intended for laying hold of substances (I).

The molares or grinders, of which there are ten in each jaw, are so called, because from their shape and size they are fitted for grinding the food. Each of the incisores and canini is furnished only with one fang; but in the molares of the under jaw we constantly find two fangs, and in those of the upper jaw three fangs. These fangs are sometimes separated into two points, and each of these points has sometimes been described as a distinct fang.

Osteology. The two first of the molares, or those nearest to the canine teeth on each side, differ from the other three, and are with great propriety named *bicuspidates* by Mr Hunter. They have sometimes only one root, and seem to be of a middle nature between the incisores and the larger molares. The two next are much larger. The fifth or last grinder on each side is smaller and shorter than the rest; and from its not cutting the gum till after the age of twenty, and sometimes not till much later in life, is called *dens sapientiae*.

There is in the structure and arrangement of all these teeth an art which cannot be sufficiently admired. To understand it properly, it will be necessary to consider the under jaw as a kind of lever, with its fixed points at its articulations with the temporal bones:—it will be right to observe, too, that its powers arise from its different muscles, but in elevation chiefly from the temporalis and masseter; and that the aliment constitutes the object of resistance. It will appear, then, that the molares, by being placed nearest the centre of motion, are calculated to press with a much greater force than the other teeth, independent of their grinding powers which they possess by means of the pterygoid muscles; and that it is for this reason we put between them any hard body we wish to break.

The canini and incisores are placed farther from this point, and of course cannot exert so much force; but they are made for cutting and tearing the food, and this form seems to make amends for their deficiency in strength.

There are examples of children who have come into the world with two, three, and even four teeth: but these examples are very rare; and it is seldom before the seventh, eighth, or ninth month after birth, that the incisores, which are the first formed, begin to pass through the gum. The symptoms of dentition, however, in consequence of irritation from the teeth, frequently take place in the fourth or fifth month.—About the twentieth or twenty-fourth month, the canini and two molares make their appearance.

The dangerous symptoms that sometimes accompany dentition, are owing to the pressure of the teeth on the gum, which they irritate so as to excite pain and inflammation. This irritation seems to occasion a gradual wasting of the gum at the part, till at length the tooth makes its appearance.

The symptoms are more or less alarming, in proportion to the resistance which the gum affords to the teeth, and according to the number of teeth which may chance to seek a passage at the same time. Were they all to appear at once, children would fall victims to the pain and excessive irritation; but Nature has so very wisely disposed them, that they usually appear one after the other, with some distance of time between each. The first incisor that appears is generally in the lower jaw, and is followed by one in the upper

(H) Mr Hunter has thought proper to vary this division. He retains the old name of *incisores* to the four fore teeth, but he distinguishes the canine teeth by the name of the *cuspidati*. The two teeth which are next to these, and which have been usually ranked with the molares, he calls the *bicuspidates*; and he gives the name of *grinders* only to the three last teeth on each side.

(I) Mr Hunter remarks of these teeth, that we may trace in them a similarity in shape, situation, and use, from the most imperfectly carnivorous animal, which we believe to be the human species, to the lion, which is the most perfectly carnivorous.

Osteology per jaw. Sometimes the canini, but more commonly one of the molares, begins to pass through the gum first.

These 20 teeth, viz. eight incisores, four canini, and eight molares, are called *temporary* or *milk teeth*, because they are all shed between the age of seven and 14, and are succeeded by what are called the *permanent* or *adult teeth*. The latter are of a firmer texture, and have larger fangs.

These adult teeth being placed in a distinct set of alveoli, the upper sockets gradually disappear, as the under ones increase in size, till at length the temporary, or upper teeth, having no longer any support, consequently fall out.

To these 20 teeth which succeed the temporary ones, 12 others are afterwards added, viz. three molares on each side in both jaws; and in order to make room for this addition, we find that the jaws gradually lengthen in proportion to the growth of the teeth; so that with 20 teeth, they seem to be as completely filled as they are afterwards with 32. This is the reason why the face is rounder and flatter in children than in adults.

With regard to the formation of the teeth, we may observe, that in a fœtus of four months, the alveolar process appears only as a shallow longitudinal groove, divided by minute ridges into a number of intermediate depressions; in each of which we find a small pulpy substance, surrounded by a vascular membrane. This pulp gradually ossifies, and its lower part is lengthened out to form the fang. When the bony part of the tooth is formed, its surface begins to be incrustated with the enamel. How the latter is formed and deposited, we are not yet able to determine.

The rudiments of some of the adult teeth begin to be formed at a very early period, for the pulp of one of the incisores may generally be perceived in a fœtus of eight months, and the ossification begins in it soon after birth. The first bicuspid begins to ossify about the fifth or sixth, and the second about the seventh year. The first adult grinder cuts the gum about the 12th, the second about the 18th, and the third, or *dens sapientie*, usually between the 20th and 30th year.

The teeth, like other bones, are liable to be affected by disease. Their removal is likewise the natural consequence of old age; for as we advance in life, the alveoli fill up, and the teeth, especially the incisores, fall out. When this happens, the chin projects forward, and the face is much shortened.

§ 4. Of the Os Hyoides (κ).

28 THE os hyoides, which is placed at the root of the tongue, was so called by the ancients on account of its supposed resemblance to the Greek letter υ.

It will be necessary to distinguish in it, its body, horns, and appendices.

The body, which is the middle and broadest part of the bone, is so placed that it may be easily felt at the fore part of the throat. Anteriorly it is irregularly

convex, and its inner surface is unequally concave. Its cornua, or horns, which are flat and a little bent, being much longer than the body part, may be described as forming the sides of the υ. The appendices, or little horns, as they are called by M. Winslow, and some other writers, are two processes which rise up from the articulations of the cornua with the body, and are usually connected with the styloid process on each side by means of a ligament.

The uses of this bone are to support the tongue, and afford attachment to a great number of muscles; some of which perform the motions of the tongue, while others act on the larynx and fauces.

SECT. III. Of the Bones of the Trunk.

THE trunk of the skeleton consists of the spine, the thorax, and the pelvis. 29

§ 1. Of the Spine.

THE spine is composed of a great number of bones called *vertebræ*, forming a long bony column, in figure, not much unlike the letter J. This column, which extends from the head to the lower part of the body, may be said to consist of two irregular and unequal pyramids, united to each other in that part of the loins where the last lumbar vertebra joins the os sacrum. 30

The *vertebræ* of the upper and longest pyramid are called *true vertebrae*, in contradistinction to those of the lowermost pyramid, which, from their being immoveable in the adult, are styled *false vertebrae*. It is upon the bones of the spine that the body turns; and it is to this circumstance they owe their name, which is derived from the Latin verb *vertere*, to turn.

The true *vertebræ* are divided into three classes of cervical, dorsal, and lumbar *vertebræ*.—The false *vertebræ* consist of the os sacrum and os coccygis.

In each vertebra, as in other bones, it will be necessary to remark the body of the bone, its processes, and cavities.

The body which is convex before, and concave behind, where it assists in forming the cavity of the spine, may be compared to part of a cylinder cut off transversely.

Each vertebra affords seven processes. The first is at the back part of the vertebra, and from its shape and direction is named the *spinous process*. On each side of this are two others, which, from their situation with respect to the spine, are called *transverse processes*. The four others are styled *oblique* or *articular processes*. They are much smaller than the spinous or transverse ones. Two of them are placed on the upper, and two on the lower part of each vertebra, rising from near the basis of each transverse process. They have gotten the name of *oblique processes*, from their situation with respect to the processes with which they are articulated; and they are sometimes styled *articular processes*, from the manner in which they are articulated with each other; the two superior processes of one vertebra being articulated with

(κ) This bone is very seldom preserved with the skeleton, and cannot be included amongst the bones of the head or in any other division of the skeleton. Thomas Bartholin has perhaps very properly described it amongst the parts contained in the mouth; but the generality of anatomical writers have placed it, as it is here, after the bones of the face.

Osteology with the two inferior processes of the vertebra above it. Each of these processes is covered with cartilage at its articulation, and their articulations with each other are by a species of ginglymus.

In each vertebra, between its body and its processes, we find a hole large enough to admit a finger. These holes or foramina, correspond with each other through all the vertebrae, and form the long bony channel in which the spinal marrow is placed. We may likewise observe four notches in each vertebra. Two of these notches are at the upper, and two at the lower part of the bone, between the oblique processes and the body of the vertebra. Each of these notches meeting with a similar opening in the vertebra above or below it, forms a foramen for the passage of blood-vessels, and of the nerves out of the spine.

The bones of the spine are united together by means of a substance, which in young subjects appears to be of a ligamentous, but in adults more of a cartilaginous nature. This intervertebral substance, which forms a kind of partition between the several vertebrae, is thicker and more flexible between the lumbar vertebrae than in the other parts of the spine, the most considerable motions of the trunk being performed on those vertebrae. This substance being very elastic, the extension and flexion of the body, and its motion backwards and forwards, or to either side, are performed with great facility. This elasticity seems to be the reason why people who have been long standing, or have carried a considerable weight, are found to be shorter than when they have been long in bed. In the two first instances the intervertebral cartilages (as they are usually called) are evidently more exposed to compression than when we are in bed in an horizontal posture.

In advanced life these cartilages become shrivelled, and of course lose much of their elasticity. This may serve to account for the decrease in stature and the stooping forward which are usually to be observed in old people.

Besides the connection of the several vertebrae by means of this intervertebral substance, there are likewise many strong ligaments, both external and internal, which unite the bones of the spine to each other. Their union is also strengthened by a variety of strong muscles that cover and surround the spine.

The bones of the spine are found to diminish in density, and to be less firm in their texture in proportion as they increase in bulk; so that the lowermost vertebrae, though the largest, are not so heavy in proportion as the upper ones. By this means the size of these bones is increased without adding to their weight; a circumstance of no little importance in a part like the spine, which, besides flexibility and suppleness, seems to require lightness as one of its essential properties.

In very young children, each vertebra consists of three bony pieces united by cartilages which afterwards ossify.

31
Vertebrae
of the
neck.

There are seven vertebrae of the neck—they are of a firmer texture than the other bones of the spine. Their transverse processes are forked for the lodgement of muscles, and at the bottom of each we observe a foramen, through which pass the cervical artery and vein. The first and second of these vertebrae must be described more particularly. The first approaches almost to an oval shape—On its superior surface it has two cavi-

Osteology ties which admit the condyles of the occipital bone with which it is articulated. This vertebra, which is called *atlas* from its supporting the head, cannot well be described as having either body or spinous process, being a kind of bony ring. Anteriorly, where it is articulated to the odontoid process of the second vertebra, it is very thin. On its upper surface it has two cavities which admit the condyles of the occipital bone. By this connection the head is allowed to move forwards and backwards, but has very little motion in any other direction.

The second vertebra has gotten the name of *dentata*, from its having, at its upper and anterior part, a process called the *odontoid* or *tooth-like process*, which is articulated with the atlas, to which this second vertebra may be said to serve as an axis. This odontoid process is of a cylindrical shape, somewhat flattened, however, anteriorly and posteriorly. At its fore-part where it is received by the atlas, we may observe a smooth, convex, articulating surface. It is by means of this articulation that the head performs its rotatory motion, the atlas in that case moving upon this odontoid process as upon a pivot. But when this motion is in any considerable degree, or, in other words, when the head moves much either to the right or left, all the cervical vertebrae seem to assist, otherwise the spinal marrow would be in danger of being divided transversely by the first vertebra.

The spinous process of each of the cervical vertebrae is shorter, and their articular processes more oblique, than in the other bones of the spine.

These 12 vertebrae are of a middle size between those of the neck and loins. At their sides we may observe two depressions, one at the upper and the other at the lower part of the body of each vertebra; which uniting with similar depressions in the vertebrae above and below, form articulating surfaces, covered with cartilages, for receiving the heads of the ribs; and at the fore part of their transverse process (excepting the two last) we find an articulating surface for receiving the tuberosity of the ribs.

These five vertebrae differ only from those of the back in their being larger, and in having their spinous processes at a greater distance from each other. The most considerable motions of the trunk are made on these vertebrae; and these motions could not be performed with so much ease, were the processes placed nearer to each other.

The os sacrum, which is composed of five or six pieces in young subjects, becomes one bone in more advanced age.

It is nearly of a triangular figure, its inferior portion being bent a little forwards. Its superior part has two oblique processes which are articulated with the last of the lumbar vertebrae; and it has likewise commonly three small spinous processes which gradually become shorter, so that the lowermost is not so long as the second, nor the second as the uppermost. Its transverse processes are formed into one oblong process, which becomes gradually smaller as it descends. Its concave or anterior side is usually smooth, but its posterior convex side has many prominences (the most remarkable of which are the spinous processes just now mentioned), which are filled up and covered with the muscular and tendinous parts behind.

This

Osteology. This bone has five pair of holes, which afford a passage to blood-vessels, and likewise to the nerves that are derived from the spinal marrow, which is continued even here, being lodged in a triangular cavity, that becomes smaller as it descends, and at length terminates obliquely at the lower part of this bone. Below the third division of the os sacrum, this canal is not completely bony as in the rest of the spine, being secured at its back part only by a very strong membrane, so that a wound at this part must be extremely dangerous.

The os sacrum is united laterally to the ossa innominata or hip-bones, and below to the coccyx.

35. **Os coccyx.** The coccyx, which, like the os sacrum, is in young people made up of three or four distinct parts, usually becomes one bone in the adult state.

It serves to support the intestinum rectum; and, by its being capable of some degree of motion at its articulation with the sacrum, and being like that bone bent forwards, we are enabled to sit with ease.

This bone is nearly of a triangular shape, being broadest at its upper part, and from thence growing narrower to its apex, where it is not bigger than the little finger.

It has got its name from its supposed resemblance to a cuckow's beak. It differs greatly from the vertebræ, being commonly without any processes, and having no cavity for the spinal marrow, or foramina for the transmission of nerves.

The spine, of which we have now finished the anatomical description, is destined for many great and important uses. The medulla spinalis is lodged in its bony canal secure from external injury. It serves as a defence to the abdominal and thoracic viscera, and at the same time supports the head, and gives a general firmness to the whole trunk.

We have before compared it to the letter *s*, and its different turns will be found to render it not very unlike the figure of that letter.—In the neck we see it projecting somewhat forward to support the head, which without this assistance would require a greater number of muscles—Lower down, in the thorax, we find it taking a curved direction backwards, and of course increasing the cavity of the chest. After this, in the loins, it again projects forwards in a direction with the centre of gravity, by which means we are easily enabled to keep the body in an erect posture, for otherwise we should be liable to fall forward. Towards its inferior extremity, however, it again recedes backward, and thus assists in forming the pelvis, the name given to the cavity in which the urinary bladder, intestinum rectum, and other viscera are placed.

If this bony column had been formed only of one piece, it would have been much more easily fractured than it is now: and by confining the trunk to a stiff situation, a variety of motions would have been altogether prevented, which are now performed with ease by the great number of bones of which it is composed.

It is firm, and yet to this firmness there is added a perfect flexibility. If it be required to carry a load upon the head, the neck becomes stiff with the assistance of its muscles, and accommodates itself to the load, as if it was composed only of one bone.—In stooping likewise, or in turning to either side, the spine

N^o 18.

turns itself in every direction, as if all its bones were separated from each other.

In a part of the body, like the spine, that is made up of so great a number of bones, and intended for such a variety of motion, there must be a greater danger of dislocation than fracture; but we shall find, that this is very wisely guarded against in every direction by the processes belonging to each vertebra, and by the ligaments, cartilages, &c. by which these bones are connected with each other.

§ 2. Of the Bones of the Thorax.

36

THE thorax, or chest, is composed of many bones, viz. the sternum which is placed at its anterior part, twelve ribs on each side which make up its lateral parts, and the dorsal vertebræ which constitute its posterior part. These last have been already described.

The sternum is the long bone which extends itself from the upper to the lower part of the breast anteriorly, and to which the ribs and the clavicles are articulated.

37

In children it is composed of several bones united by cartilages; but as we advance in life, most of these cartilages ossify, and the sternum in the adult state is found to consist only of three pieces, and sometimes becomes one bone. It is however generally described as being composed of three parts—one superior, which is broad, thick, and short; and one in the middle, which is thinner, narrower, and longer than the other.

It terminates at its lower part by a third piece, which is called the *xyphoid* or *sword-like cartilage*, from its supposed resemblance to the blade of a sword, and because in young subjects it is commonly in a cartilaginous state.

We have already observed, that this bone is articulated with the clavicle on each side. It is likewise joined to the fourteen true ribs, viz. seven on its right, and seven on its left side.

The ribs are bones shaped like a bow, forming the sides of the chest. There are twelve on each side. They are distinguished into true and false ribs: The seven upper ribs which are articulated to the sternum are called *true ribs*, and the five lower ones that are not immediately attached to that bone are called *false ribs*.

38
Of the ribs.

On the inferior and interior surface of each rib, we observe a sinuosity for the lodgement of an artery, vein, and nerve.

The ribs are not bony through their whole length, their anterior part being cartilaginous. They are articulated with the vertebræ and sternum. Every rib (or at least the greater number of them) has at its posterior part two processes; one at its extremity, called the head of the rib, by means of which it is articulated with the body of two vertebræ; and another, called its tuberosity, by which it is articulated with the transverse process of the lowest of these two vertebræ. The first rib is not articulated by its extremity to two vertebræ, being simply attached to the upper part of the first vertebra of the back. The seven superior or true ribs are articulated anteriorly with the sternum by their cartilages; but the false ribs are supported in a different manner—the eighth, which is the first of these ribs, being

Osteology. being attached by its cartilage to the seventh; the ninth to the eighth, &c.

The two lowermost ribs differ likewise from all the rest in the following particulars: They are articulated only with the body of a vertebra, and not with a transverse process; and anteriorly, their cartilage is loose, not being attached to the cartilages of the other ribs; and this seems to be, because the most considerable motions of the trunk are not performed on the lumbar vertebræ alone, but likewise on the two last vertebræ of the back: so that if these two ribs had been confined at the fore part like the other ribs, and had been likewise articulated with the bodies of two vertebræ, and with the transverse processes, the motion of the two last vertebræ, and consequently of the whole trunk, would have been impeded.

The ribs help to form the cavity of the thorax; they afford attachment to different muscles; they are useful in respiration; and they serve as a security to the heart and lungs.

§ 3. Of Bones of the Pelvis.

39 THE pelvis is composed of the os sacrum, os coccygis, and two ossa innominata. The two first of these bones were included in the account of the spine, to which they more properly belong.

In children, each os innominatum is composed of three distinct bones; but as we advance in life the intermediate cartilages gradually ossify, and the marks of the original separation disappear, so that they become one irregular bone; still however continuing to retain the names of ilium, ischium, and pubis, by which their divisions were originally distinguished, and to be described as three different bones by the generality of anatomists. The os ilium forms the upper and most considerable part of the bone, the os ischium its lower and posterior portion, and the os pubis its fore part.

40 **Os ilium.** The os ilium, or haunch bone, is articulated posteriorly to the os sacrum by a firm cartilaginous substance, and is united to the os pubis before, and to the os ischium below. Its superior portion is thin, and terminates in a ridge called the crista or spine of the ilium, and more commonly known by the name of the haunch. This crista rises up like an arch, being turned somewhat outwards, so as to resemble the wings of a phaeton.

Externally this bone is unequally prominent and hollowed for the lodgement of muscles; internally we find it smooth and concave. At its lower part there is a considerable ridge on its inner surface. This ridge extends from the os sacrum, and corresponds with a similar prominence both on that bone and the ischium; forms with the inner part of the ossa pubis what in midwifery is termed the brim of the pelvis.

The crista, or spine, which at first is an epiphysis, has two considerable tuberosities; one anteriorly, and the other posteriorly, which is the largest of the two: These, from their projecting more than the parts of the bone below them, have gotten the name of spinal processes. From the anterior spinous process, the sartorius and tensor vaginæ femoris muscles have their origin; and below the posterior process we observe a considerable niche in the bone, which, in the recent subject, is formed into a large foramen, by means of a strong ligament that is stretched over its lower part

Vol. I. Part II.

from the os sacrum to the sharp-pointed process of the ischium. This hole affords a passage to the great sciatic nerve, and to the posterior crural vessels under the pyriform muscle, part of which likewise passes out here.

41 The os ischium, or hip-bone, which is of a very irregular figure, constitutes the lower lateral parts of the pelvis, and is commonly divided into its body, tuberosity, and ramus. The body forms the lower and most considerable portion of the acetabulum, and sends a sharp-pointed process backwards, called the spine of the ischium. To this process the ligament adheres, which was just now spoken of, as forming a foramen for the passage of the sciatic nerve.—The tuberosity, which is the lowest part of the trunk, and supports us when we sit, is large and irregular, affording origin to several muscles. From this tuberosity we find the bone becoming thinner and narrower. This part, which has the name of ramus or branch, passes forwards and upwards, and concurs with the ramus of the os pubis, to form a large hole called the *foramen magnum ischii*, or *thyroideum*, as it is sometimes named from its resemblance to a door or shield. This hole, which in the recent subject is closed by a strong membrane called the obturator ligament, affords through its whole circumference attachment to muscles. At its upper part where we observe a niche in the bone, it gives passage to the obturator vessels and nerves, which go to the inner part of the thigh. Nature seems every where to avoid an unnecessary weight of bone, and this foramen, no doubt, serves to lighten the bones of the pelvis.

42 The os pubis, or share-bone, which with its fellow forms the fore-part of the pelvis, is the smallest division of the os innominatum. It is united to its fellow by means of a strong cartilage, which forms what is called the symphysis pubis.

In each os pubis we may distinguish the body of the bone, its angle, and ramus. The body or outer part is united to the os ilium. The angle comes forwards to form the symphysis, and the ramus is a thin process which unites with the ramus of the ischium, to form the foramen thyroideum.

The three bones we have described as composing each os innominatum, all assist in forming the acetabulum, in which the head of the os femoris is received.

This cavity is every where lined with a smooth cartilage, excepting at its inner part, where we may observe a little fossa, in which are lodged the mucilaginous glands of the joint. We may likewise notice the pit or depression made by the round ligament, as it is improperly called, which, by adhering to this cavity and to the head of the thigh-bone, helps to secure the latter in the socket.

These bones, which are united to each other and to the spine by many very strong ligaments, serve to support the trunk, and to connect it with the lower extremities; and at the same time to form the pelvis or basin, in which are lodged the intestines and urinary bladder, and in women the uterus; so that the study of this part of osteology is of the utmost importance in midwifery.

It is worthy of observation, that in women the os sacrum is usually shorter, broader, and more hollowed, the ossa ilia more expanded, and the inferior opening of the pelvis larger than in men.

Osteology.

SECT. IV. *Of the Extremities.*

43 THE parts of the skeleton consist of the upper extremity and the lower.

§ 1. *Of the UPPER EXTREMITY.*

44 THIS consists of the shoulder, the arm, and the hand.

I. *Of the Shoulder.*

45 The shoulder consists of two bones, the clavicle and the scapula.

46
Of the
clavicle.

The former, which is so named from its resemblance to the key in use amongst the ancients, is a little curved at both its extremities like an italic *f*. It is likewise called *jugulum*, or collar-bone, from its situation. It is about the size of the little finger, but longer, and being of a very spongy substance, is very liable to be fractured. In this, as in other long bones, we may distinguish a body and two extremities. The body is rather flattened than rounded. The anterior extremity is formed into a slightly convex head, which is nearly of a triangular shape. The inferior surface of the head is articulated with the sternum. The posterior extremity, which is flatter and broader than the other, is connected to a process of the scapula, called *acromion*. Both these articulations are secured by ligaments, and in that with the sternum we meet with a moveable cartilage, to prevent any injury from friction.

The clavicle serves to regulate the motions of the scapula, by preventing it from being brought too much forwards, or carried too far backwards. It affords origin to several muscles, and helps to cover and protect the subclavian vessels, which derive their name from their situation under this bone.

47
Of the
scapula.

The scapula, or shoulder-blade, which is nearly of a triangular shape, is fixed to the posterior part of the true ribs, somewhat in the manner of a buckler. It is of a very unequal thickness, and like all other broad, flat bones, is somewhat cellular. Externally it is convex, and interiorly concave, to accommodate itself to the convexity of the ribs. We observe in this bone three unequal sides, which are thicker and stronger than the body of the bone, and are therefore termed its *costæ*. The largest of the three, called also the basis, is turned towards the vertebræ. Another, which is less than the former, is below this; and the third, which is the least of the three, is at the upper part of the bone. Externally the bone is elevated into a considerable spine, which, rising small at the basis of the scapula, becomes gradually higher and broader, and divides the outer surface of the bone into two fossæ. The superior of these, which is the smallest, serves to lodge the supra spinatus muscle; and the inferior fossa, which is much larger than the other, gives origin to the infra spinatus. This spine terminates in a broad and flat process at the top of the shoulder, called the *processus acromion*, to which the clavicle is articulated. This process is hollowed at its lower part, to allow a passage to the supra and infra spinati muscles. The scapula has likewise another considerable process at its upper part, which, from its resemblance to the beak of a bird, is called the *coracoid process*. From the

outer side of this coracoid process, a strong ligament passes to the *processus acromion*, which prevents a luxation of the os humeri upwards. A third process begins by a narrow neck, and ends in a cavity called *glenoid*, for the connection of the os humeri.

The scapula is articulated with the clavicle and os humeri, to which last it serves as a fulcrum; and by varying its position it affords a greater scope to the bones of the arm in their different motions. It likewise gives origin to several muscles, and posteriorly serves as a defence to the trunk.

2. *Bones of the Arm.*

The arm is commonly divided into two parts, which are articulated to each other at the elbow. The upper part retains the name of arm, properly so called, and the lower part is usually called the fore arm.

The arm is composed of a single bone called *os humeri*. This bone, which is almost of a cylindrical shape, may be divided into its body and its extremities.

The upper extremity begins by a large, round, smooth head, which is admitted into the *glenoid cavity* of the scapula. On the upper and fore part of the bone there is a groove for lodging the long head of the biceps muscle of the arm; and on each side of the groove, at the upper end of the bone, there is a tubercle to which the spinati muscles are fixed.

The lower extremity has several processes and cavities. The principal processes are its two condyles, one exterior and the other interior, and of these the last is the largest. Between these two we observe two lateral protuberances, which, together with a middle cavity, form as it were a kind of pulley upon which the motions of the fore-arm are chiefly performed. At each side of the condyles, as well exteriorly as interiorly, there is another eminence which gives origin to several muscles of the hand and fingers. Posteriorly and superiorly, speaking with respect to the condyles, we observe a deep fossa which receives a considerable process of the ulna; and anteriorly and opposite to this fossa, we observe another, which is much less, and receives another process of the same bone.

The body of the bone has at its upper and anterior part a furrow which begins from behind the head of the bone, and serves to lodge the tendon of a muscle. The body of the os humeri is hollow through its whole length, and like all other long bones has its marrow.

This bone is articulated at its upper part to the scapula. This articulation, which allows motion every way, is surrounded by a capsular ligament that is sometimes torn in luxation, and becomes an obstacle to the easy reduction of the bone. Its lower extremity is articulated with the bones of the fore-arm.

The fore-arm is composed of two bones, the ulna and radius.

The ulna or elbow-bone is much less than the os humeri, and becomes gradually smaller as it descends to the wrist. At its upper part it has two processes and two cavities. Of the two processes, the largest, which is situated posteriorly, and called the *olecranon*, is admitted into the posterior fossa of the os humeri. The other process is placed anteriorly, and is called the *coronoid process*. In bending the arm it enters into the interior fossa of the os humeri. This process being

Osteology.

Osteology. being much smaller than the other, permits the fore-arm to bend inwards; whereas the olecranon, which is shaped like a hook, reaches the bottom of its fossa in the os humeri as soon as the arm becomes straight, and will not permit the fore-arm to be bent backwards. The ligaments likewise oppose this motion.

Between the two processes we have described, there is a considerable cavity called the *fygmoid cavity*, divided into two fossæ by a small eminence, which passes from one process to the other; it is by means of this cavity and the two processes, that the ulna is articulated with the os humeri by *ginglimus*.

At the bottom of the coronoid process interiorly, there is a small *fygmoid cavity*, which serves for the articulation of the ulna with the radius.

The body of the ulna is of a triangular shape: Its lower extremity terminates by a small head and a little *styloid process*. The ulna is articulated above to the os humeri—both above and below to the radius, and to the wrist at its lower extremity. All these articulations are secured by means of ligaments. The chief use of this bone seems to be to support and regulate the motions of the radius.

⁵² **Of the radius.** The radius, which is so named from its supposed resemblance to the spoke of a wheel, is placed at the inside of the fore-arm. It is somewhat larger than the ulna, but not quite so long as that bone. Its upper part is cylindrical, hollowed superiorly to receive the outer condyle of the os humeri. Laterally it is admitted into the little *fygmoid cavity* of the ulna, and the cylindrical part of the bone turns in this cavity in the motions of pronation and supination (L). This bone follows the ulna in flexion and extension, and may likewise be moved round its axis in any direction. The lower extremity of the radius is much larger and stronger than its upper part; the ulna, on the contrary, is smaller and weaker below than above; so that they serve to supply each others deficiencies in both those parts.

On the external side of this bone, we observe a small cavity which is destined to receive the lower end of the ulna; and its lower extremity is formed into a large cavity, by means of which it is articulated with the bones of the wrist, and on this account it is sometimes called *manubrium manus*. It supports the two first bones of the wrist on the side of the thumb, whereas the ulna is articulated with that bone of the wrist which corresponds with the little finger.

Through the whole length both of this bone and the ulna, a ridge is observed which affords attachment to an interosseous ligament. This ligament fills up the space between the two bones.

53

3. Bones of the Hand.

⁵⁴ **Of the carpus.**

The carpus or wrist consists of eight small bones of an irregular shape, and disposed in two unequal rows. Those of the upper row are articulated with the bones of the fore-arm, and those of the lower one with the metacarpus.

The ancient anatomists described these bones numerically; Lyserus seems to have been the first who gave

to each of them a particular name. The names he adopted are found on the figure of the bones, and are now pretty generally received, except the first, which instead of *καρυοειδης* (the name given to it by Lyserus, on account of its sinus, that admits a part of the os magnum), has by later writers been named *Scaphoides* or *Navicularis*. This, which is the outermost of the upper row (considering the thumb as the outer side of the hand), is articulated with the radius; on its inner side it is connected with the os lunare, and below to the trapezium and trapezoides. Next to this is a smaller bone, called the *os lunare*: because its outer side, which is connected with the scaphoides, is shaped like a crescent. This is likewise articulated with the radius. On its inner side it joins the os cuneiforme, and anteriorly, the os magnum and os unciforme.

The os cuneiforme, which is the third bone in the upper row, is compared to a wedge, from its being broader above, at the back of the hand, than it is below. Posteriorly it is articulated with the ulna, and anteriorly with the os unciforme.

These three bones form an oblong articulating surface, covered by cartilage, by which the hand is connected with the fore-arm.

The os pisiforme, or pea-like bone, which is smaller than the three just now described, though generally classed with the bones of the upper row, does not properly belong to either series, being placed on the under surface of the os cuneiforme, so as to project into the palm of the hand. The four bones of the second row correspond with the bones of the thumb and fingers; the first, second, and fourth, are from their shapes named *trapezium*, *trapezoides*, and *unciforme*; the third from its being the largest bone of the carpus, is styled *os magnum*.

All these bones are convex towards the back, and slightly concave towards the palm of the hand; their articulating surfaces are covered with cartilages, and secured by many strong ligaments, particularly by two ligamentous expansions, called the external and internal annular ligaments of the wrist. The former extends in an oblique direction from the os pisiforme to the *styloid process* of the radius, and is an inch and a half in breadth; the latter or internal annular ligament is stretched from the os pisiforme and os unciforme, to the os scaphoides and trapezium. These annular ligaments likewise serve to bind down the tendons of the wrist and fingers.

⁵⁵ The metacarpus consists of four bones, which support the fingers; externally they are a little convex, and internally somewhat concave, where they form the palm of the hand. They are hollow, and of a cylindrical shape. **Of the metacarpus.**

At each extremity they are a little hollowed for their articulation; superiorly with the bones of the carpus, and inferiorly with the first phalanx of the fingers, in the same manner as the several phalanges of the fingers are articulated with each other.

⁵⁶ The five fingers of each hand are composed of fifteen bones, disposed in three ranks called phalanges: The bones of the first phalanx, which are articulated with

4 S 2

the

(L) The motions of pronation and supination may be easily described. If the palm of the hand, for instance, is placed on the surface of a table, the hand may be said to be in a state of pronation; but if the back part of the hand is turned towards the table, the hand will be then in a state of supination.

Osteology the metacarpus, are the largest, and those of the last phalanx the smallest. All these bones are larger at their extremities than in their middle part.

We observe at the extremities of the bones of the carpus, metacarpus, and fingers, several inequalities that serve for their articulation with each other; and these articulations are strengthened by means of the ligaments which surround them.

It will be easily understood that this multiplicity of bones in the hand (for there are 27 in each hand) is essential to the different motions we wish to perform. If each finger was composed only of one bone instead of three, it would be impossible for us to grasp any thing.

57.

§ 2. Of the Lower Extremities.

Each lower extremity is divided into four parts, viz. the os femoris, or thigh bone; the rotula, or knee-pan; the leg; and the foot.

1. Of the Thigh.

58
Of the os
femoris.

The thigh is composed only of this bone, which is the largest and strongest we have. It will be necessary to distinguish its body and extremities: Its body, which is of a cylindrical shape, is convex before and concave behind, where it serves to lodge several muscles. Throughout two-thirds of its length we observe a ridge called *linea aspera*, which originates from the trochanters, and after running for some way downwards, divides into two branches, that terminate in the tuberosities at the lower extremity of the bone.

At its upper extremity we must describe the neck and smooth head of the bone, and likewise two considerable processes: The head, which forms the greater portion of a sphere unequally divided, is turned inwards, and received into the great cotyloid cavity of the os innominatum. At this part of the bone there is a little fossa to be observed, to which the round ligament is attached, and which we have already described as tending to secure the head of this bone in the great acetabulum. The neck is almost horizontal considered with respect to its situation with the body of the bone. Of the two processes, the external one, which is the largest, is called trochanter major; and the other, which is placed on the inside of the bone, trochanter minor. They both afford attachment to muscles. The articulation of the os femoris with the trunk is strengthened by means of a capsular ligament, which adheres every where round the edge of the great cotyloid cavity of the os innominatum, and surrounds the head of the bone.

The os femoris moves upon the trunk in every direction.

At the lower extremity of the bone are two processes called the condyles, and an intermediate smooth cavity, by means of which it is articulated with the leg by ginglymus.

All round the under end of the bone there is an irregular surface where the capsular ligament of the joint has its origin, and where blood-vessels go into the substance of the bone.

Between the condyles there is a cavity posteriorly, in which the blood-vessels and nerves are placed, secure from the compression to which they would otherwise be exposed in the action of bending the leg, and which would not fail to be hurtful.

At the side of each condyle externally, there is a tuberosity, from whence the lateral ligaments originate, which are extended down to the tibia.

A ligament likewise arises from each condyle posteriorly. One of these ligaments passes from the right to the left, and the other from the left to the right, so that they intersect each other, and for that reason are called the *cross ligaments*.

The lateral ligaments prevent the motion of the leg upon the thigh to the right or left; and the cross ligaments, which are also attached to the tibia, prevent the latter from being brought forwards.

In new-born children all the processes of this bone are cartilaginous.

2. The Rotula, or Knee-pan.

The rotula, patella, or knee-pan, as it is differently called, is a flat bone about four or five inches in circumference, and is placed at the fore-part of the joint of the knee. In its shape it is somewhat like the common figure of the heart, with its point downwards.

It is thinner at its edge than in its middle part; at its fore part it is smooth and somewhat convex; its posterior surface, which is more unequal, affords an elevation in the middle which is admitted between the two condyles of the os femoris.

This bone is retained in its proper situation by a strong ligament which every where surrounds it, and adheres both to the tibia and os femoris; it is likewise firmly connected with the tibia by means of a strong tendinous ligament of an inch in breadth, and upwards of two inches in length, which adheres to the lower part of the patella, and to the tuberosity at the upper end of the tibia. On account of this connection, it is very properly considered as an appendage to the tibia, which it follows in all its motions, so as to be to it what the olecranon is to the ulna. There is this difference, however, that the olecranon is a fixed process; whereas the patella is moveable, being capable of sliding from above downwards and from below upwards. This mobility is essential to the rotatory motion of the leg.

In very young children this bone is entirely cartilaginous.

The principal use of the patella seems to be to defend the articulation of the knee from external injury; it likewise tends to increase the power of the extensor muscles of the leg, by removing their direction farther from the centre of motion in the manner of a pulley.

3. Of the Leg.

The leg is composed of two bones: Of these the inner one, which is the largest, is called tibia; the other is much smaller, and named fibula.

The tibia, which is so called from its resemblance to the musical pipe of the ancients, has three surfaces, and is not very unlike a triangular prism. Its posterior surface is the broadest; anteriorly it has a considerable ridge called the shin, between which and the skin there are no muscles. At the upper extremity of this bone are two surfaces, a little concave, and separated from each other by an intermediate elevation. The two little cavities receive the condyles of the os femoris, and the eminence between them is admitted into the cavity which we spoke of as being between the two condyles; so that this articulation affords a specimen of the complete

Osteology plete ginglymus. Under the external edge of the upper end of this bone is a circular flat surface, which receives the head of the fibula.

At the lower and inner portion of the tibia, we observe a considerable process called *malleolus internus*. The basis of the bone terminates in a large transverse cavity, by which it is articulated with the uppermost bone of the foot. It has likewise another cavity at its lower end and outer side, which is somewhat oblong, and receives the lower end of the fibula.

The tibia is hollow through its whole length.

62
Of the fibula.

The fibula is a small long bone situated on the outside of the tibia. Its superior extremity does not reach quite so high as the upper part of the tibia, but its lower end descends somewhat lower. Both above and below, it is articulated with the tibia by means of the lateral cavities we noticed in our description of that bone.

Its lower extremity is stretched out into a coronoid process, which is flattened at its inside, and is convex externally, forming what is called the *malleolus externus*, or *outer angle*. This is rather lower than the *malleolus internus* of the tibia.

The body of this bone, which is irregularly triangular, is a little hollow at its internal surface, which is turned towards the tibia; and it affords like that bone, through its whole length, attachment to a ligament, which from its situation is called the interosseous ligament.

63

4. Of the Foot.

The foot consists of the tarsus, metatarsus, and toes.

64
Of the tarsus.

The tarsus is composed of seven bones, viz. the astragalus, os calcis, os naviculare, os cuboides, and three others called cuneiform bones.

65
Of the astragalus.

The astragalus is a large bone with which both the tibia and fibula are articulated. It is the uppermost bone of the foot; it has several surfaces to be considered; its upper, and somewhat posterior part, which is smooth and convex, is admitted into the cavity of the tibia. Its lateral parts are connected with the malleoli of the two bones of the leg; below, it is articulated with the os calcis, and its anterior surface is received by the os naviculare. All these articulations are secured by means of ligaments.

66
Of the os calcis.

The os calcis, or calcaneum, which is of a very irregular figure, is the largest bone of the foot. Behind, it is formed into a considerable tuberosity called the heel; without this tuberosity, which supports us in an erect posture, and when we walk, we should be liable to fall backwards.

On the internal surface of this bone, we observe a considerable sinuosity, which affords a passage to the tendon of a muscle: and to the posterior part of the os calcis, a strong tendinous cord called *tendo achillis* (M) is attached, which is formed by the tendons of several muscles united together. The articulation of this with the other bones is secured by means of ligaments.

67
Of the os naviculare

The os naviculare, or scaphoides, (for these two terms have the same signification), is so called on account of its resemblance to a little bark. At its posterior part, which is concave, it receives the astragalus; anteriorly

it is articulated with the cuneiform bones, and laterally it is connected with the os cuboides.

The os cuboides forms an irregular cube. Posteriorly it is articulated with the os calcis; anteriorly it supports the two last bones of the metatarsus, and laterally it joins the third cuneiform bone and the os naviculare.

Each of the ossa cuneiformia, which are three in number, resembles a wedge, and from this similitude their name is derived. They are placed next to the metatarsus by the sides of each other, and are usually distinguished into *os cuneiforme externum*, *medium* or *minimum*, and *internum* or *maximum*. The superior surface of these bones, from their wedge-like shape, is broader than that which is below, where they help to form the sole of the foot; posteriorly they are united to the os naviculare, and anteriorly they support the three first metatarsal bones.

When these seven bones composing the tarsus are viewed together in the skeleton, they appear convex above, where they help to form the upper part of the foot; and concave underneath, where they form the hollow of the foot, in which the vessels, tendons, and nerves of the foot are placed secure from pressure.

They are united to each other by very strong ligaments, and their articulation with the foot is secured by a capsular and two lateral ligaments; each of the latter is covered by an annular ligament of considerable breadth and thickness, which serves to bind down the tendons of the foot, and at the same time to strengthen the articulation.

The os cuneiforme externum is joined laterally to the os cuboides.

These bones complete our account of the tarsus. Though what we have said of this part of the osteology has been very simple and concise, yet many readers may not clearly understand it; but if they will be pleased to view these bones in their proper situation in the skeleton, all that we have said of them will be easily understood.

The metatarsus is made up of five bones, whereas the metacarpus consists only of four. The cause of this difference is, that in the hand the last bone of the thumb is not included among the metacarpal bones; whereas in the foot the great toe has only two bones. The first of these bones supports the great toe and is much larger than the rest, which nearly resemble each other in size.

These bones are articulated by one extremity with the cuneiform bones and the os cuboides, and by their other end with the toes.

Each of the toes, like the fingers, consists of three bones, except the great toe, which is formed of two bones. Those of the other four are distinguished into three phalanges. Although the toes are more confined in their motion than the fingers, yet they appear to be perfectly fitted for the purposes they are designed for. In walking, the toes bring the centre of gravity perpendicular to the advanced foot; and as the soles of the foot are naturally concave, we can at pleasure increase this concavity, and form a kind of vault, which adjusts itself to the different inequalities that occur

(M) This tendon is sometimes ruptured by jumping, dancing, or other violent efforts.

Osteology. cur to us in walking; and which, without this mode of arrangement, would incommode us exceedingly, especially when bare-footed.

72

§ 4. *Of the Offa SESAMOIDEA.*

BESIDES the bones we have already described, there are several small ones that are met with only in the adult skeleton, and in persons who are advanced in life; which, from their supposed general resemblance to the seeds of the sesamum, are called *offa sesamoidea*. They are commonly to be seen at the first joint of the great toe, and sometimes at the joints of the thumb; they are likewise now and then to be found at the lower extremity of the fibula, upon the condyles of the thigh-bone, under the os cuboides of the tarsus,

Osteology. and in other parts of the body. Their size and number seem constantly to be increased by age and hard labour; and as they are generally found in situations where tendons and ligaments are most exposed to the action of muscles, they are now generally considered as ossified portions of ligaments or tendons.

The upper surface of these bones is usually convex and adherent to the tendon that covers it; the side which is next to the joint is smooth and flat. Though their formation is accidental, yet they seem to be of some use, by raising the tendons farther from the centre of motion, and consequently increasing the power of the muscles. In the great toe and thumb they are likewise useful, by forming a groove for the flexor tendons.

EXPLANATION OF THE PLATES OF OSTEOLOGY.

PLATE XVII.

FIG. 1. A Front-view of the MALE SKELETON.

A, The os frontis. B, the os parietale. C, The coronal future. D, The squamous part of the temporal bones. E, The squamous future. F, The zygoma. G, The mastoid process. H, The temporal process of the sphenoid bone. I, The orbit. K, the os malæ. L, The os maxillare superius. M, Its nasal process. N, The ossa nasi. O, The os unguis. P, The maxilla inferior. Q, The teeth, which are sixteen in number in each jaw. R, The seven cervical vertebræ, with their intermediate cartilages. S, Their transverse processes. T, The twelve dorsal vertebræ, with their intermediate cartilages. U, The five lumbar vertebræ. V, Their transverse processes. W, The upper part of the os sacrum. X, Its lateral parts. The holes seen on its fore part are the passages of the undermost spinal nerves and small vessels. Opposite to the holes, the marks of the original divisions of the bone are seen. Y, The os ilium. Z, Its crest or spine. a, The anterior spinous processes. b, The brim of the pelvis. c, The ischiatic niche. d, The os ischium. e, Its tuberosity. f, Its spinous process. g, Its crus. h, The foramen thyroideum. i, The os pubis. k, The symphysis pubis. l, The crus pubis. m, The acetabulum. n, The seventh or last true rib. o, The twelfth or last false rib. p, The upper end of the sternum. q, The middle piece. r, The under end, or cartilage ensiformis. s, The clavicle. t, The internal surface of the scapula. u, Its acromion. v, Its coracoid process. w, Its cervix. x, The glenoid cavity. y, The os humeri. z, Its head, which is connected to the glenoid cavity. 1, Its external tubercle. 2, Its internal tubercle. 3, The groove for lodging the long head of the biceps muscle of the arm. 4, The internal condyle. 5, The external condyle. Between 4 and 5, the trochlea. 6, The radius. 7, Its head. 8, Its tubercle. 9, The ulna. 10, Its coronoid process. 11, 12, 13, 14, 15, 16, 17, 18, The carpus; composed of os naviculare, os lunare, os cuneiforme, os pisiforme, os trapezium, os trapezoides, os magnum, os unciforme. 19, The five bones of the metacarpus. 20, The two bones of the thumb. 21, The three bones of each of the fingers. 22, The os femoris. 23, Its head. 24, Its cervix. 25, The trochanter major. 26, The trochanter minor. 27, The inter-

nal condyle. 28, The external condyle. 29, The rotula. 30, The tibia. 31, Its head. 32, Its tubercle. 33, Its spine. 34, The malleolus internus. 35, The fibula. 36, Its head. 37, The malleolus externus. The tarsus is composed of, 38, The astragalus; 39, The os calcis; 40, The os naviculare; 41, Three ossa cuneiformia, and the os cuboides, which is not seen in this figure. 42, The five bones of the metatarsus. 43, The two bones of the great toe. 44, The three bones of each of the small toes.

FIG. 2. A Front-view of the SKULL.

A, The os frontis. B, The lateral part of the os frontis, which gives origin to part of the temporal muscle. C, The superciliary ridge. D, The superciliary hole through which the frontal vessels and nerves pass. EE, The orbital processes. F, The middle of the transverse future. G, The upper part of the orbit. H, The foramen opticum. I, The foramen lacerum. K, The inferior orbital fissure. L, The os unguis. M, The ossa nasi. N, The os maxillare superius. O, Its nasal process. P, The external orbital hole through which the superior maxillary vessels and nerves pass. Q, The os malæ. R, A passage for small vessels into, or out of, the orbit. S, The under part of the left nostril. T, The septum narium. U, The os spongiosum superius. V, The os spongiosum inferius. W, The edge of the alveoli, or spongy sockets, for the teeth. X, The maxilla inferior. Y, The passage for the inferior maxillary vessels and nerves.

FIG. 3. A Side-view of the SKULL.

A, The os frontis. B, The coronal future. C, The os parietale. D, An arched ridge which gives origin to the temporal muscle. E, The squamous future. F, The squamous part of the temporal bone; and, farther forwards, the temporal process of the sphenoid bone. G, The zygomatic process of the temporal bone. H, The zygomatic future. I, The mastoid process of the temporal bone. K, The meatus auditorius externus. L, The orbital plate of the frontal bone, under which is seen the transverse future. M, The pars plana of the ethmoid bone. N, The os unguis. O, The right os nasi. P, The superior maxillary bone. Q, Its nasal process. R, The two dentes incisores. S, The dens caninus. T, The two small molares. U, The three large molares. V, The os malæ. W, The lower jaw. X, Its angle. Y, The coronoid

Fig. 5.

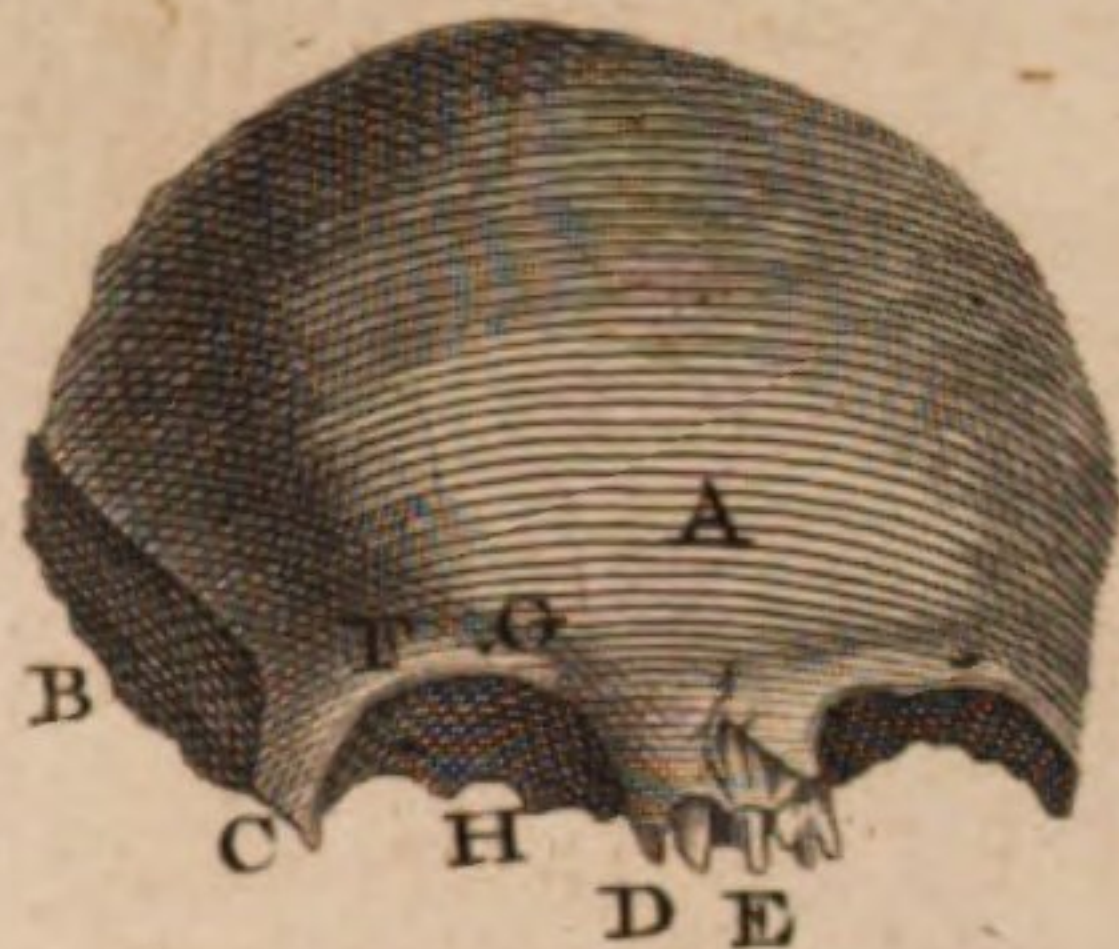


Fig. 1.

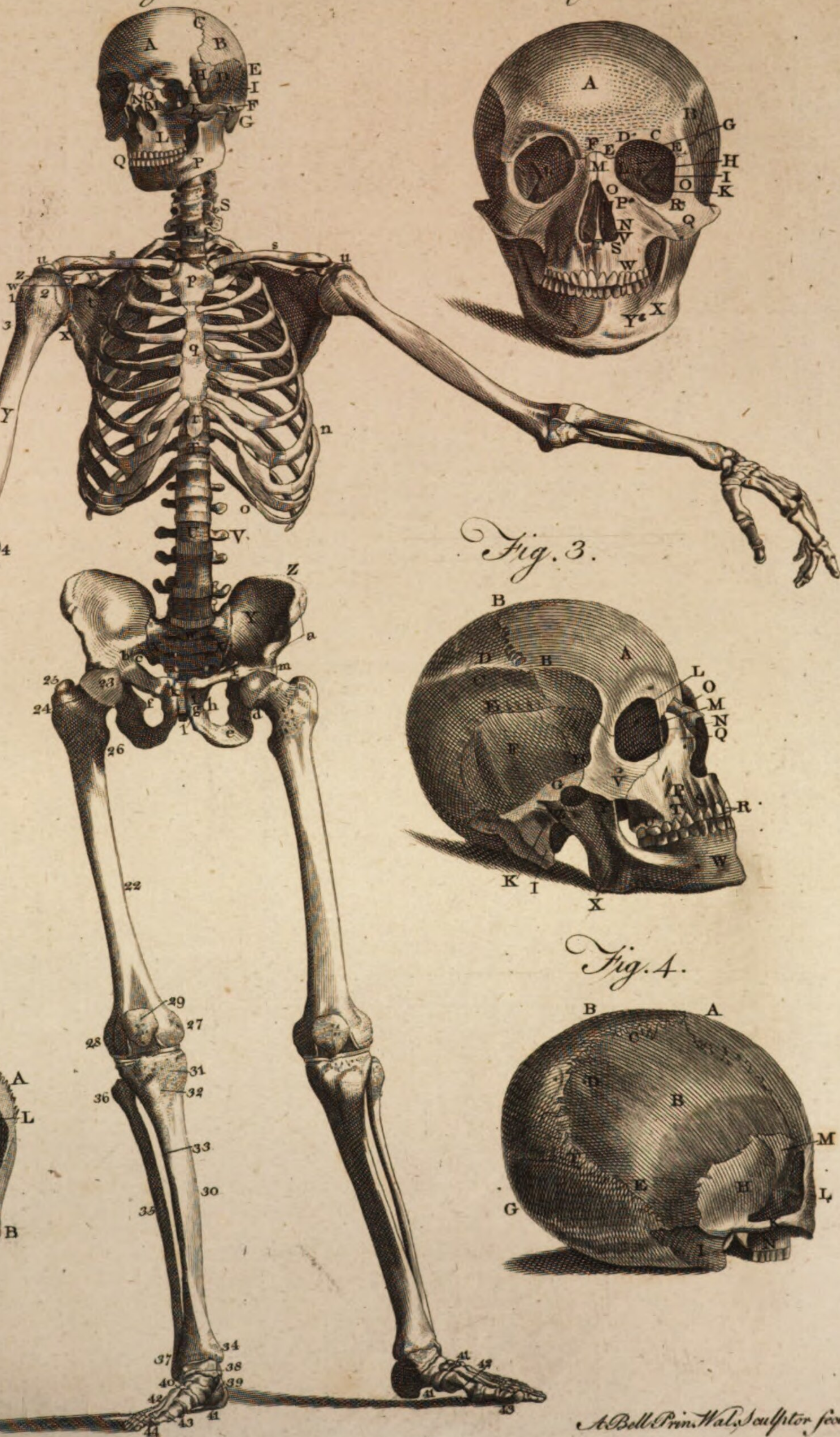


Fig. 2.



Fig. 3.

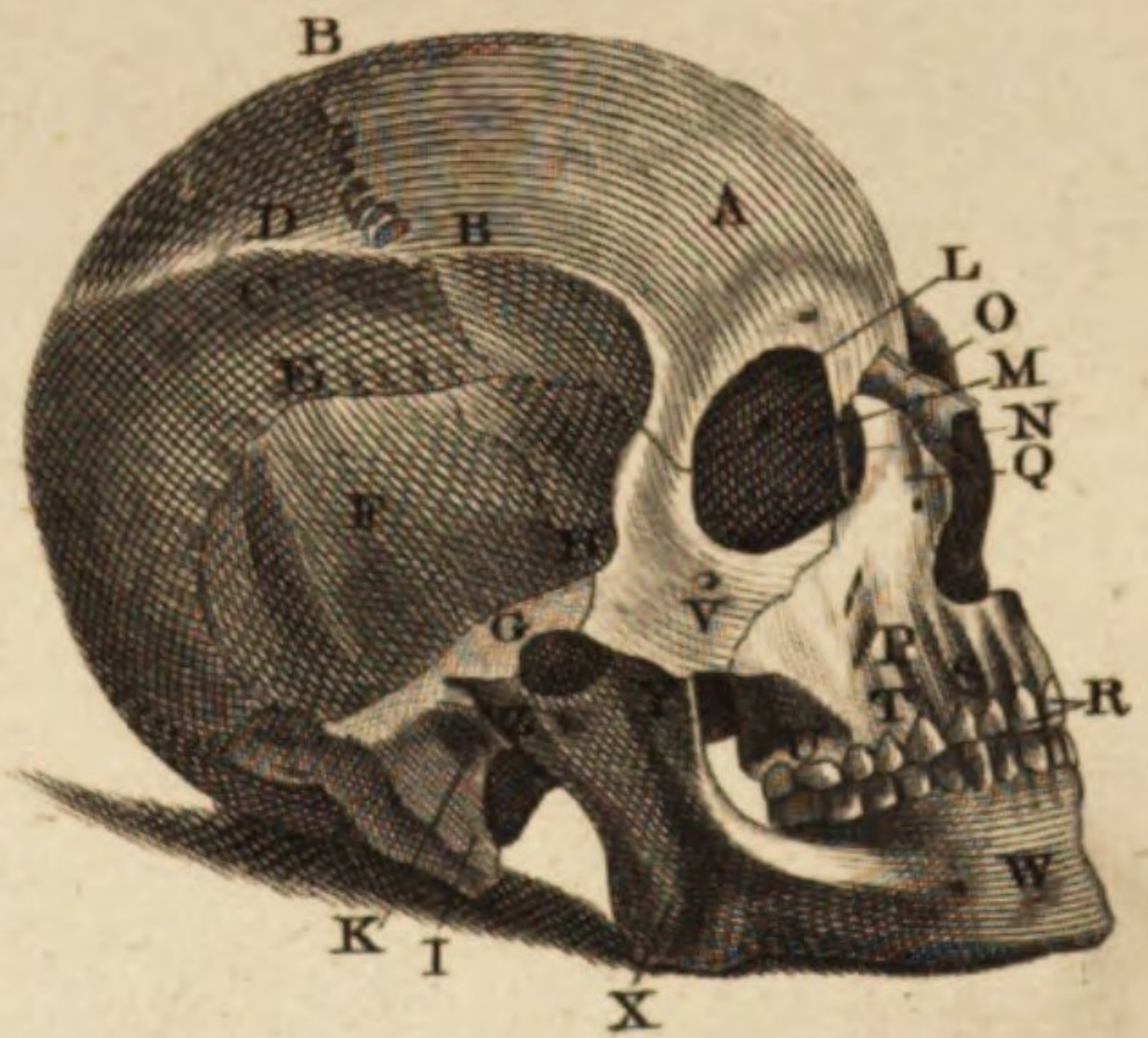


Fig. 6.

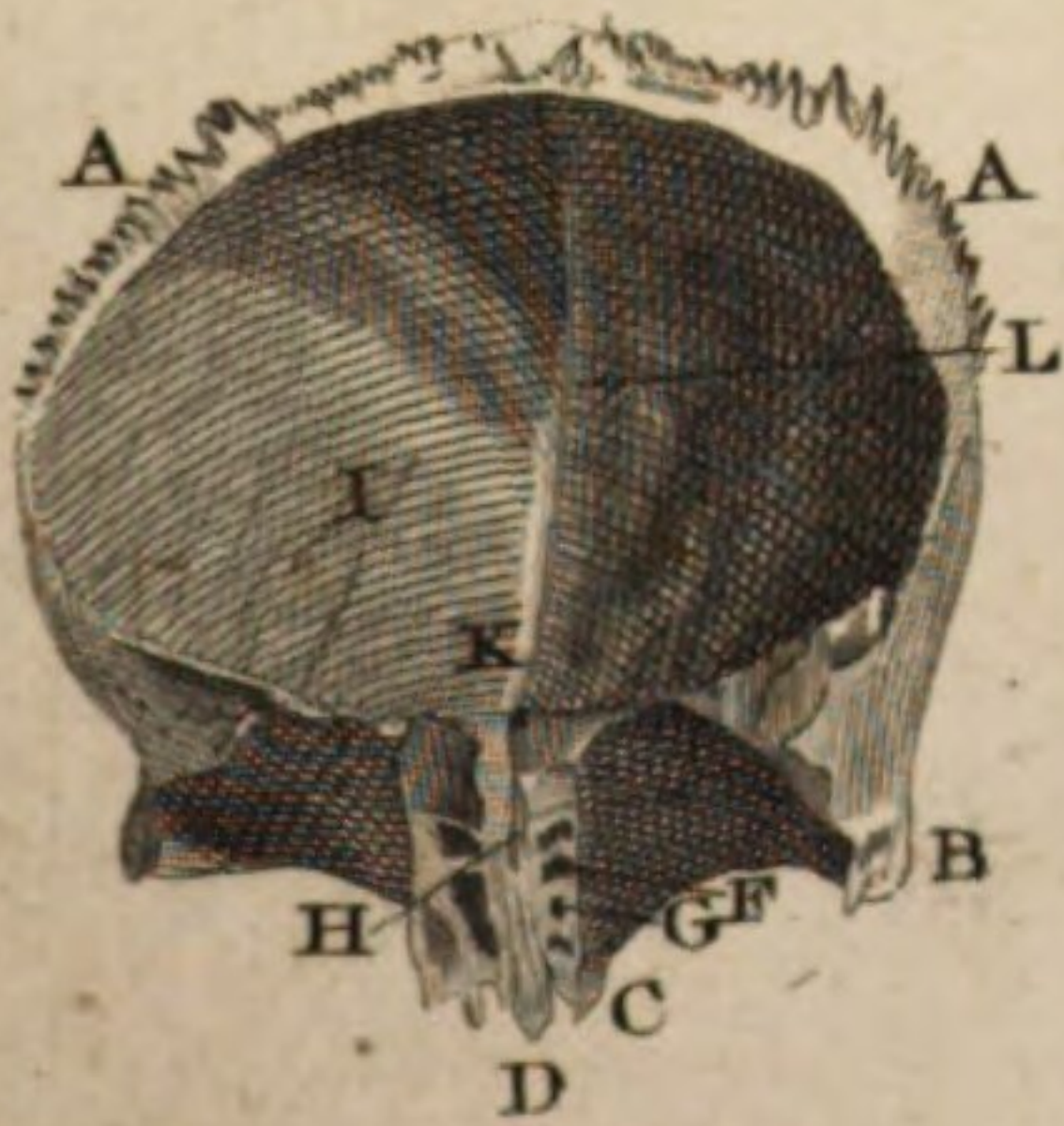
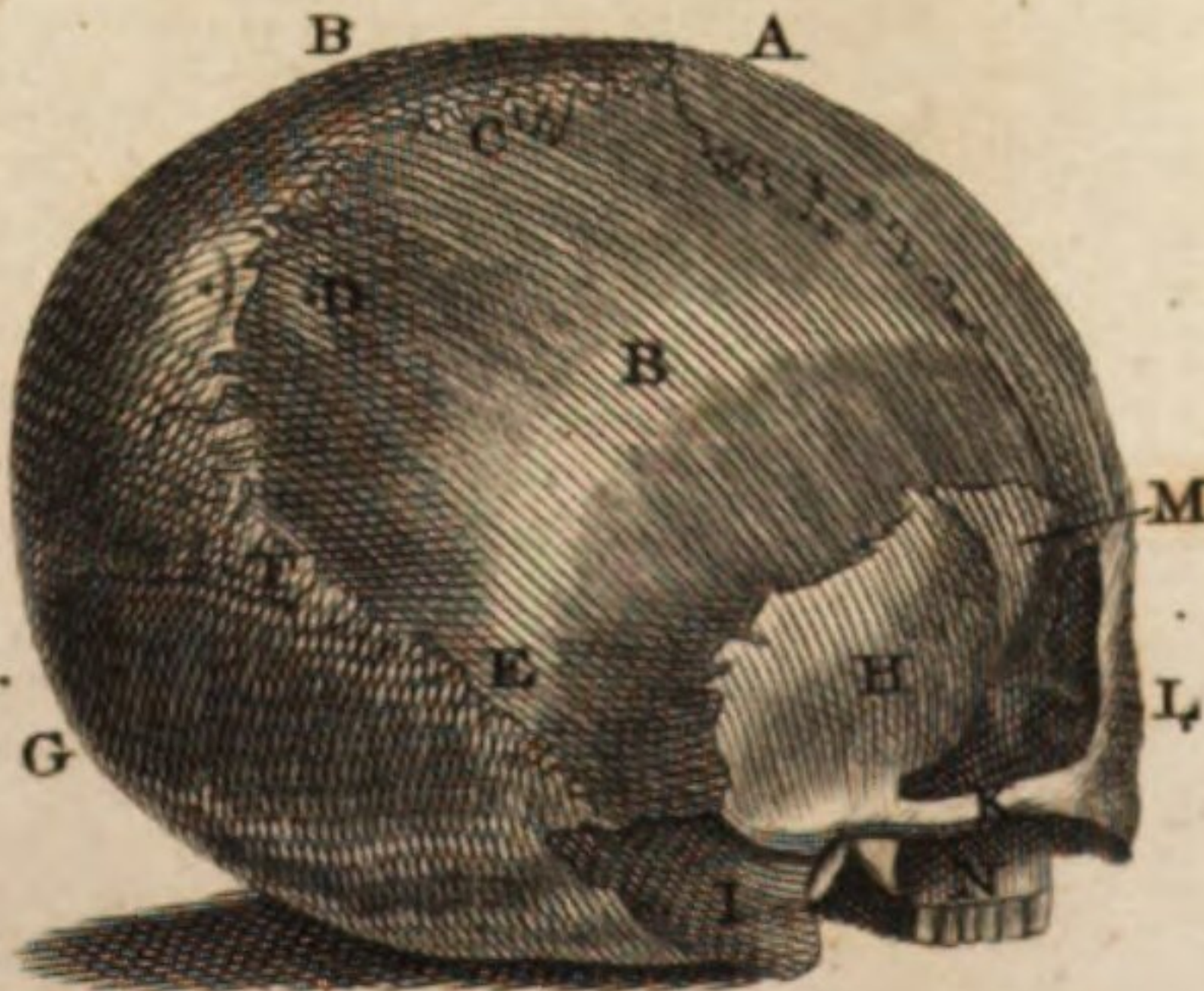
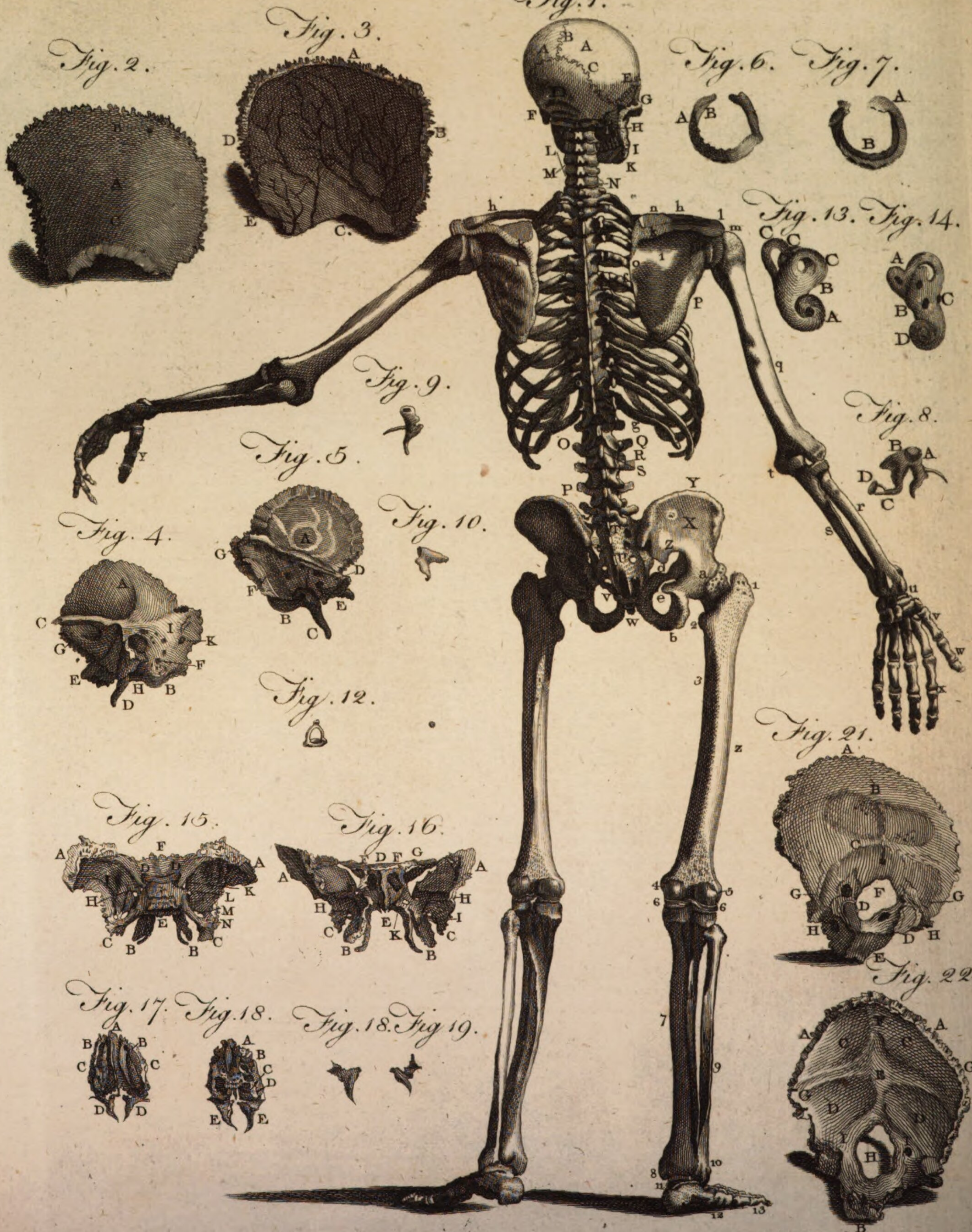


Fig. 4.



A. Bell Pinx. W. Al. Sculptor fecit.



Osteology. coronoid process. Z, The condyloid process, by which the jaw is articulated with the temporal bone.

FIG. 4. The posterior and right side of the SKULL.

A, The os frontis. B B, The ossa parietalia. C, The sagittal future. D, The parietal hole, through which a small vein runs to the superior longitudinal sinus. E, The lambdoid future. FF, Ossa triquetra. G, The os occipitis. H, The squamous part of the temporal bone. I, The mastoid process. K, The zygoma. L, The os malæ. M, The temporal part of the sphenoid bone. N, The superior maxillary bone and teeth.

FIG. 5. The External Surface of the Os FRONTIS.

A, The convex part. B, Part of the temporal fossa. C, The external angular process. D, The internal angular process. E, The nasal process. F, The superciliary arch. G, The superciliary hole. H, The orbital plate.

FIG. 6. The Internal Surface of the Os FRONTIS.

A A, The serrated edge which assists to form the coronal future. B, The external angular process. C, The internal angular process. D, The nasal process. E, The orbital plate. F, The cells which correspond with those of the ethmoid bone. G, The passage from the frontal sinus. H, The opening which receives the cribriform plate of the ethmoid bone. I, The cavity which lodges the fore part of the brain. K, The spine to which the falx is fixed. L, The groove which lodges the superior longitudinal sinus.

PLATE XVIII.

FIG. 1. A Back-view of the SKELETON.

A A, The ossa parietalia. B, The sagittal future. C, The lambdoid future. D, The occipital bone. E, The squamous future. F, The mastoid process of the temporal bone. G, The os malæ. H, The palate plates of the superior maxillary bones. I, The maxilla inferior. K, The teeth of both jaws. L, The seven cervical vertebrae. M, Their spinous processes. N, Their transverse and oblique processes. O, The last of the twelve dorsal vertebrae. P, The fifth or last lumbar vertebra. Q, The transverse processes. R, The oblique processes. S, The spinous processes. T, The upper part of the os sacrum. U, The posterior holes which transmit small blood-vessels and nerves. V, The under part of the os sacrum which is covered by a membrane. W, The os coccygis. X, The os ilium. Y, Its spine or crest. Z, The ischiatic niche. a, The os ischium. b, Its tuberosity. c, Its spine. d, The os pubis. e, The foramen hydroideum. f, The seventh or last true rib. g, The twelfth or last false rib. h, The clavicle. i, The scapula. k, Its spine. l, Its acromion. m, Its cervix. n, Its superior costa. o, Its posterior costa. p, Its inferior costa. q, The os humeri. r, The radius. s, The ulna. t, Its oleclanon. u, All the bones of the carpus, excepting the os pisiforme, which is seen in plate XVII. fig. i. v, The five bones of the metacarpus. w, The two bones of the thumb. x, The three bones of each of the fingers. y, The two sesamoid bones at the root of the left thumb. z, The os femoris. 1, The trochanter major. 2, The trochanter minor. 3, The linea aspera. 4, The internal condyle. 5, The external

condyle. 6 6, The simular cartilages. 7, The tibia. 8, The malleolus internus. 9, The fibula. 10, The malleolus externus. 11, The tarsus. 12, The metatarsus. 13, The toes.

FIG. 2. The External Surface of the Left Os PARIETALE.

A, The convex smooth surface. B, The parietal hole. C, An arch made by the beginning of the temporal muscle.

FIG. 3. The Internal Surface of the same bone.

A, Its superior edge, which, joined with the other, forms the sagittal future. B, The anterior edge, which assists in the formation of the coronal future. C, The inferior edge for the squamous future. D, The posterior edge for the lambdoid future. E, A depression made by the lateral sinus. FF, The prints of the arteries of the dura mater.

FIG. 4. The External Surface of the Left Os TEMPORUM.

A, The squamous part. B, The mastoid process. C, The zygomatic process. D, The styloid process. E, The petrosal process. F, The meatus auditorius externus. G, The glenoid cavity for the articulation of the lower jaw. H, The foramen stylo-mastoideum for the portio dura of the seventh pair of nerves. I, Passages for blood-vessels into the bone. K, The foramen mastoideum through which a vein goes to the lateral sinus.

FIG. 5. The Internal Surface of the Left Os TEMPORUM.

A, The squamous part; the upper edge of which assists in forming the squamous future. B, The mastoid process. C, The styloid process. D, The pars petrosa. E, The entry of the seventh pair, or auditory nerve. F, The fossa, which lodges a part of the lateral sinus. G, The foramen mastoideum.

FIG. 6. The External Surface of the OSSEOUS CIRCLE which terminates the meatus auditorius externus.

A, The anterior part. B, A small part of the groove in which the membrana tympani is fixed.

N. B. This, with the subsequent bones of the ear, are here delineated as large as the life.

FIG. 7. The Internal Surface of the OSSEOUS CIRCLE.

A, The anterior part. B, The groove in which the membrana tympani is fixed.

FIG. 8. The Situation and Connection of the Small Bones of the EAR.

A, The malleus. B, The incus. C, The os orbiculare. D, The stapes.

FIG. 9. The MALLEUS, with its Head, Handle, and Small Processes.

FIG. 10. The INCUS, with its Body, Superior and Inferior Branches.

FIG. 11. The Os ORBICULARE.

FIG. 12. The STAPES, with its Head, Base, and two Crura.

FIG. 13. An Internal View of the LABYRINTH of the EAR.

A, The hollow part of the cochlea, which forms a space.

Osteology. Share of the meatus auditorius internus. B, The vestibulum. C C C, The semicircular canals.

PLATE XIX.

FIG. 14. An External View of the LABYRINTH.

A, The semicircular canals. B, The fenestra ovalis which leads into the vestibulum. C, The fenestra rotunda which opens into the cochlea. D, The different turns of the cochlea.

FIG. 15. The Internal Surface of the Os SPHENOIDES.

A A, The temporal processes. B B, The pterygoid processes. C C, The spinous processes. D D, The anterior clinoid processes. E, The posterior clinoid process. F, The anterior process which joins the ethmoid bone. G, The cella turcica for lodging the glandula pituitaria. H, The foramen opticum. K, The foramen lacerum. L, The foramen rotundum. M, The foramen ovale. N, The foramen spinale.

FIG. 16. The External Surface of the Os SPHENOIDES.

A A, The temporal processes. B B, The pterygoid processes. C C, The spinous processes. D, The processus azygos. E, The small triangular processes which grow from the body of the bone. F F, The orifices of the sphenoidal sinuses. G, The foramen lacerum. H, The foramen rotundum. I, The foramen ovale. K, The foramen pterygoideum.

FIG. 17. The External View of the Os ETHMOIDES.

A, The nasal lamella. B B, The grooves between the nasal lamella and ossa spongiosa superiora. C C, The ossa spongiosa superiora. D D, The sphenoidal cornua. See Fig. 16. E.

FIG. 18. The Internal View of the Os ETHMOIDES.

A, The crista galli. B, The cribriform plate, with the different passages of the olfactory nerves. C C, Some of the ethmoidal cells. D, The right os planum. E E, The sphenoidal cornua.

FIG. 19. The right SPHENOIDAL CORNU.

FIG. 20. The left SPHENOIDAL CORNU.

FIG. 21. The External Surface of the Os OCCIPITIS.

A, The upper part of the bone. B, The superior arched ridge. C, The inferior arched ridge. Under the arches are prints made by muscles of the neck. D D, The two condyloid processes which articulate the head with the spine. E, The cuneiform process. F, The foramen magnum through which the spinal marrow passes. G G, The posterior condyloid foramina which transmit veins into the lateral sinuses. H H, The foramina lingualia for the passage of the ninth pair of nerves.

FIG. 22. The Internal Surface of the Os OCCIPITIS.

A A, The two sides which assist to form the lambdoid future. B, The point of the cuneiform process where it joins the sphenoid bone. C C, The prints made by the posterior lobes of the brain. D D, Prints made by the lobes of the cerebellum. E, The cruciform ridge for the attachment of the processes of the dura mater. F, The course of the superior longitudinal sinuses. G G, The course of the two lateral sinuses. H, The foramen magnum. I I, The posterior condyloid foramina.

N° 18.

FIG. 1. A Side-view of the SKELETON.

A A, The ossa parietalia. B, The sagittal future. C, The os occipitis. D D, The lambdoid future. E, The squamous part of the temporal bone. F, The mastoid process. G, The meatus auditorius externus. H, The os frontis. I, The os malæ. K, The os maxillare superius. L, The maxilla inferior. M, The teeth of both jaws. N, The seventh, or last cervical vertebra. O, The spinous processes. P, Their transverse and oblique processes. Q, The twelfth or last dorsal vertebra. R, The fifth, or last lumbar vertebra. S, The spinous processes. T, Openings between the vertebrae for the passage of the spinal nerves. U, The under end of the os sacrum. V, The os coccygis. W, The os ilium. X, The anterior spinous processes. Y, The posterior spinous processes. Z, The ischiatic niche. a, The right os ilium. b, The ossa pubis. c, The tuberosity of the left os ischium. d, The scapula. e, Its spine. f, The os humeri. g, The radius. h, The ulna. i, The carpus. k, The metacarpal bone of the thumb. l, The metacarpal bones of the fingers. m, The two bones of the thumb. n, The three bones of each of the fingers. o, The os femoris. p, Its head. q, The trochanter major. r, The external condyle. s, The rotula. t, The tibia. u, The fibula. v, The malleolus externus. w, The astragalus. x, The os calcis. y, The os naviculare. z, The three ossa cuneiformia. 1, The os cuboides. 2, The five metatarsal bones. 3, The two bones of the great toe. 4, The three bones of each of the small toes.

FIG. 2. A View of the Internal Surface of the Base of the SKULL.

A A A, The two tables of the skull with the diploe. B B, The orbital plates of the frontal bone. C, The crista galli, with cribriform-plate of the ethmoidal bone on each side of it, through which the first pair of nerves pass. D, The cuneiform process of the occipital bone. E, The cruciform ridge. F, The foramen magnum for the passage of the spinal marrow. G, The zygoma, made by the joining of the zygomatic processes of the os temporum and os malæ. H, The pars squamosa of the os temporum. I, The pars mammillaris. K, The pars petrosa. L, The temporal process of the sphenoid bone. M M, The anterior clinoid processes. N, The posterior clinoid process. O, The sella turcica. P, The foramen opticum, for the passage of the optic nerve and ocular artery of the left side. Q, The foramen lacerum, for the third, fourth, sixth, and first of the fifth pair of nerves and ocular vein. R, The foramen rotundum, for the second of the fifth pair. S, The foramen ovale, for the third of the fifth pair. T, The foramen spinale, for the principal artery of the dura mater. U, The entry of the auditory nerve. V, The passage for the lateral sinus. W, The passage of the eighth pair of nerves. X, The passage of the ninth pair.

FIG. 3. A View of the External Surface of the Base of the SKULL.

A, The two dentes incisores of the right side. B, The dens caninus. C, The two small molares. D, The three large molares. E, The foramen incisivum, which gives passage to small blood-vessels and nerves. F, The palate.

Fig. 1.



Fig. 8. Fig. 9.

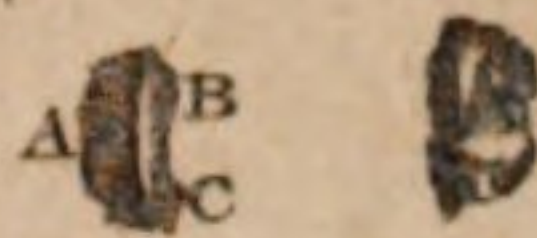


Fig. 4. Fig. 5.



Fig. 7.



Fig. 6.



Fig. 11. Fig. 10.



Fig. 12. Fig. 13.



Fig. 14. Fig. 15.



Fig. 17.



Fig. 16.



Fig. 19.



Fig. 2.

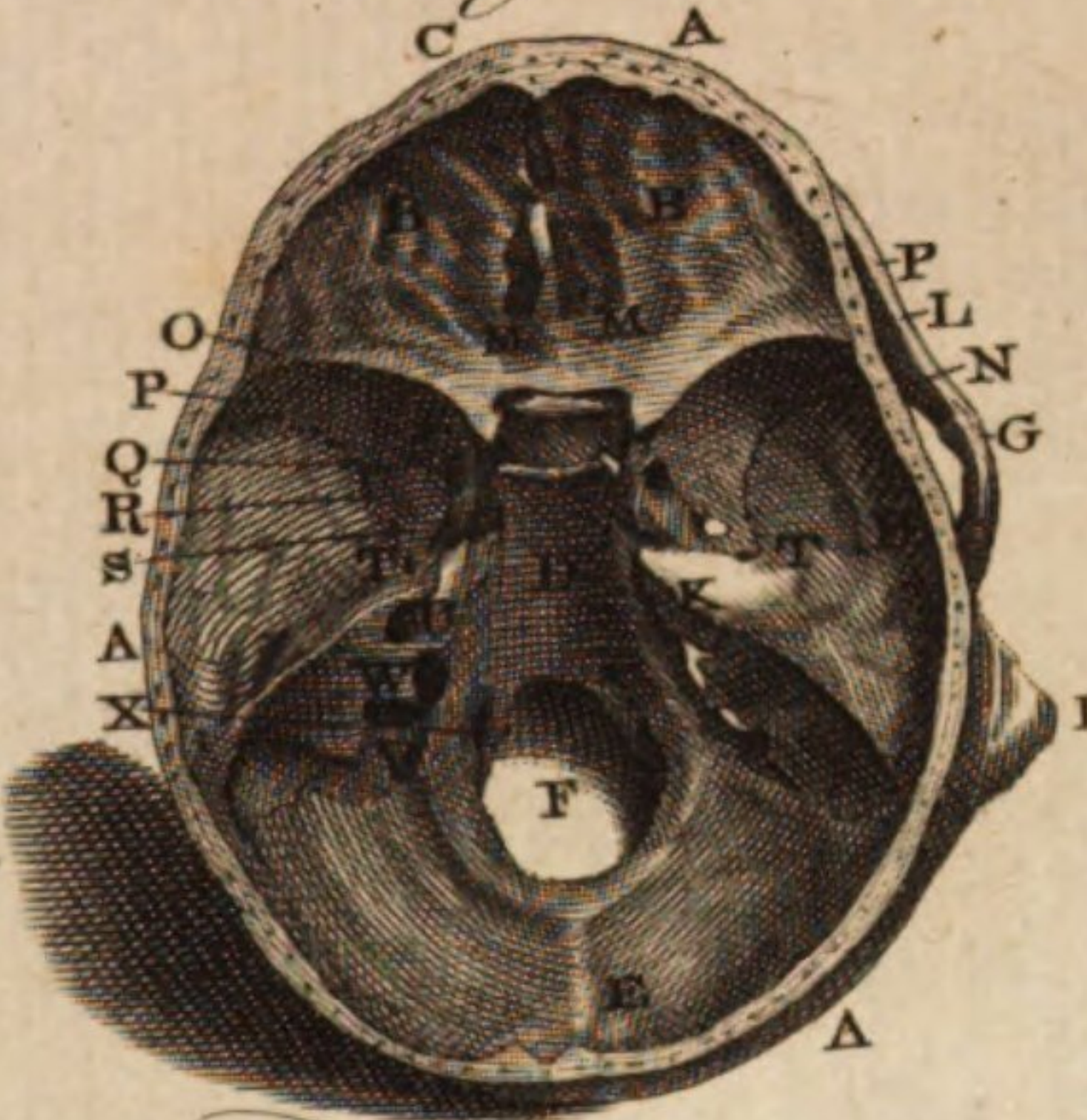


Fig. 3.

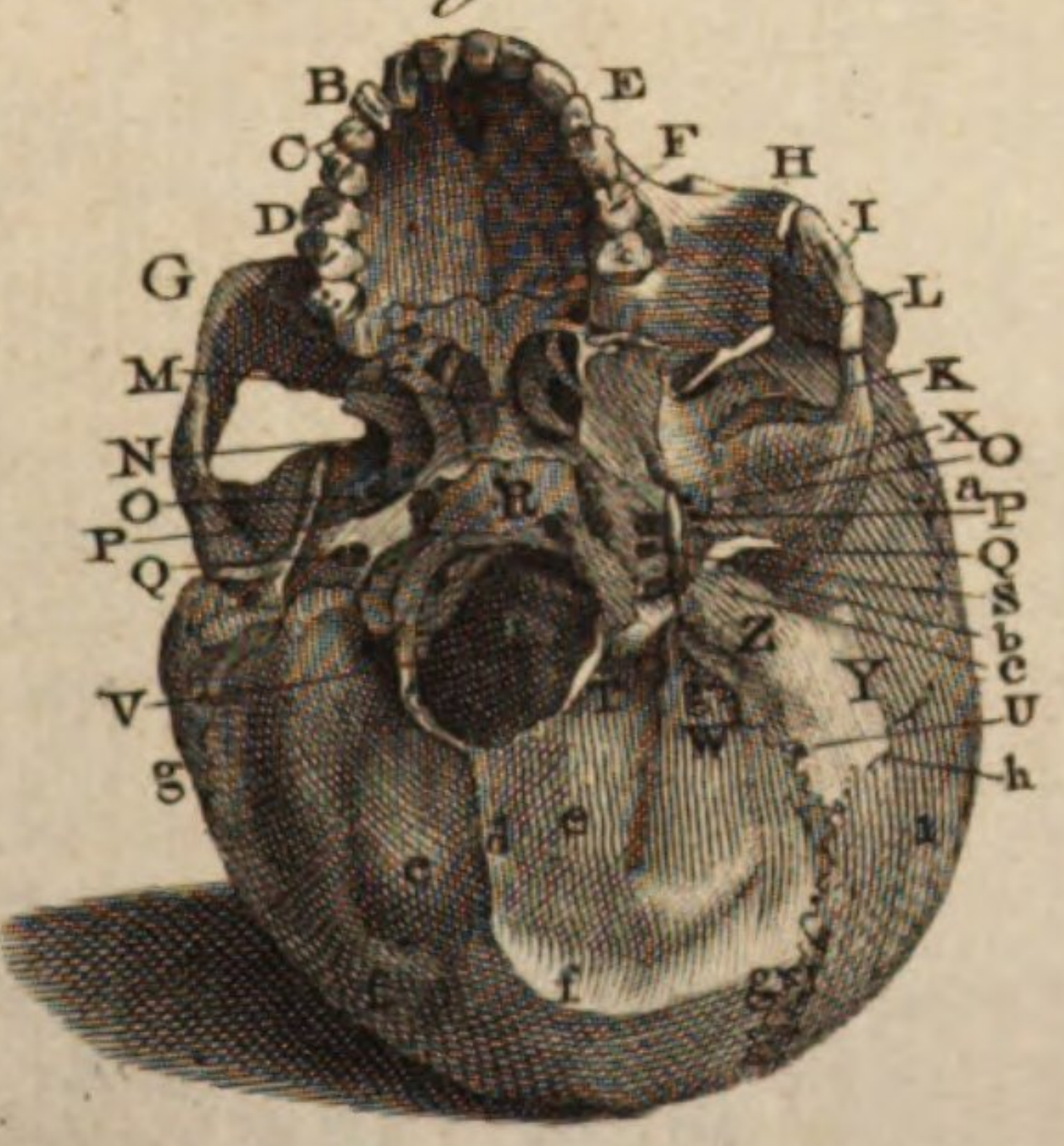
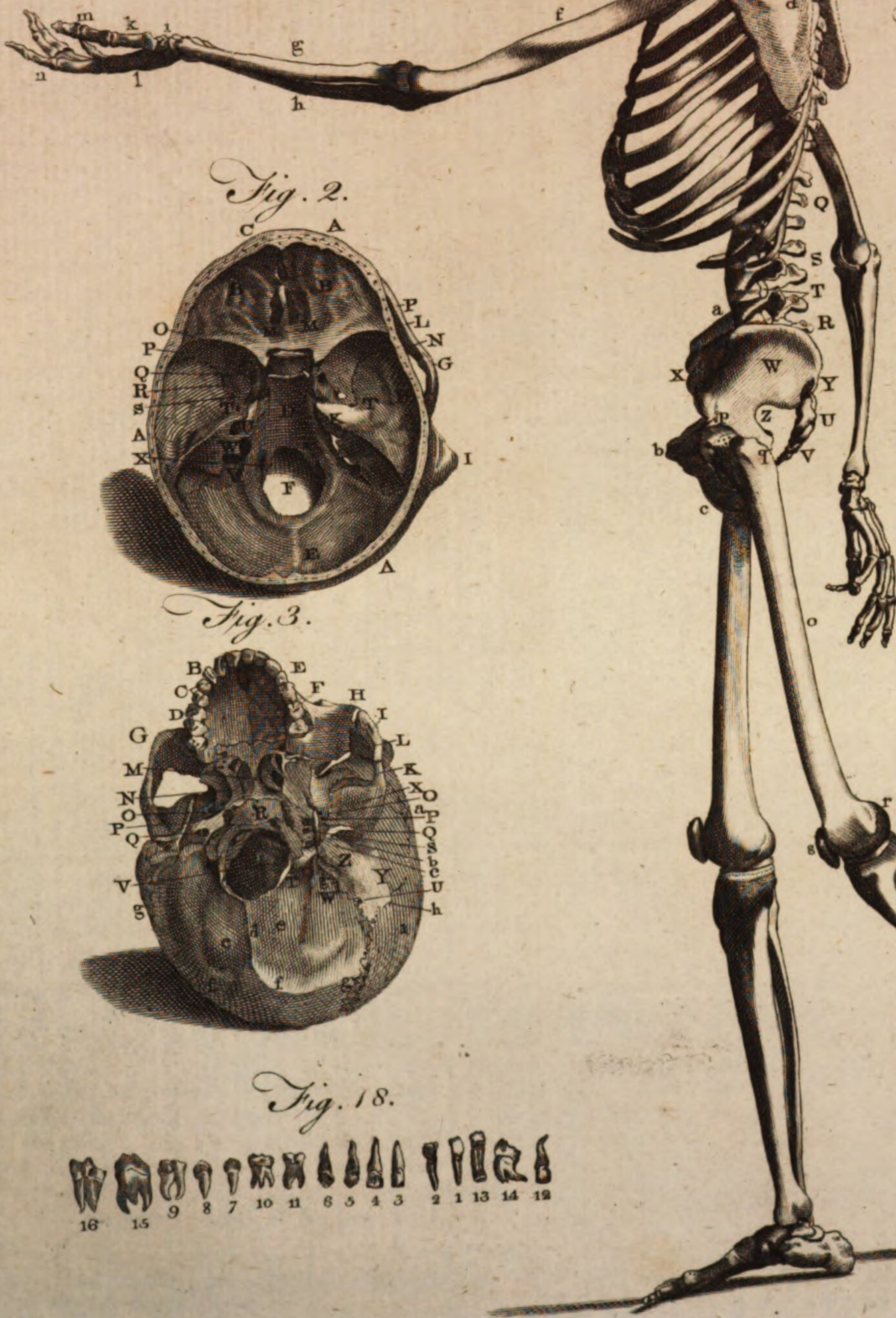


Fig. 18.



A. Bell Pin. Wall. Sculptor fecit.

Osteology. palate-plates of the ossa maxillaria and palati, joined by the longitudinal and transverse palate sutures. G, The foramen palatinum posterius, for the palatine vessels and nerves. H, The os maxillare superius of the right side. I, The os malæ. K, The zygomatic process of the temporal bone. L, The posterior extremity of the ossa spongiosa. M, The posterior extremity of the vomer, which forms the back-part of the septum nasi. N, The pterygoid process of the right side of the sphenoid bone. O O, The foramina ovalia. P P, The foramina spinalia. Q Q, The passages of the internal carotid arteries. R, A hole between the point of each pars petrosa and cuneiform process of the occipital bone, which is filled up with a ligamentous substance in the recent subject. S, The passage of the left lateral sinus. T, The posterior condyloid foramen of the left side. U, The foramen mastoideum. V, The foramen-magnum. W, The inferior orbital fissure. X, The glenoid cavity, for the articulation of the lower jaw. Y, The squamous part of the temporal bone. Z, The mastoid process, at the inner side of which is a fossa for the posterior belly of the digastric muscle. a, The styloid process. b, The meatus auditorius externus. c, The left condyle of the occipital bone. d, The perpendicular occipital spine. e e, The inferior horizontal ridge of the occipital bone. f f, The superior horizontal ridge, which is opposite to the crucial ridge where the longitudinal sinus divides to form the lateral sinuses. g g g, The lambdoid suture. h, The left squamous suture. i, The parietal bone.

FIG. 4. The anterior surface of the Ossa NASI.

A, The upper part, which joins the os frontis. B, The under end, which joins the cartilage of the nose. C, Their inner edge, where they join each other.

FIG. 5. The posterior surface of the Ossa NASI.

A A, Their cavity, which forms part of the arch of the nose. B B, Their ridge or spine which projects a little to be fixed to the fore-part of the septum narium.

FIG. 6. The external surface of the Os MAXILLARE SUPERIUS of the left side.

A, The nasal process. B, The orbital plate. C, The unequal surface which joins the os malæ. D, The external orbital hole. E, The opening into the nostril. F, The palate plate. G, The maxillary tuberosity. H, Part of the os palati. I, The two dentes incisores. K, The dens caninus. L, The two small dentes molares. M, The three large dentes molares.

FIG. 7. The internal surface of the Os MAXILLARE SUPERIUS and Os PALATI.

A, The nasal process. B B, Eminences for the connection of the os spongiosum inferius. D, The under end of the lacrymal groove. E, The antrum maxillare. F, The nasal spine, between which and B is the cavity of the nostril. G, The palate-plate. H, The orbital part of the os palati. I, The nasal plate. K, The suture which unites the maxillary and palate bones. L, The pterygoid process of the palate bone.

FIG. 8. The external surface of the right Os UNGUIS.

A, The orbital part. B, The lacrymal part. C, The ridge between them.

VOL. I. Part II.

FIG. 9. The internal surface of the right Os UNGUIS. **Osteology.**

This side of the bone has a furrow opposite to the external ridge; all behind this is irregular, where it covers part of the ethmoidal cells.

FIG. 10. The external surface of the left Os MALÆ.

A, The superior orbital process. B, The inferior orbital process. C, The malar process. D, The zygomatic process. E, The orbital plate. F, A passage for small vessels into or out of the orbit.

FIG. 11. The internal surface of the left Os MALÆ.

A, The superior orbital process. B, The inferior orbital process. C, The malar process. D, The zygomatic process. E, The internal orbital plate or process.

FIG. 12. The external surface of the right Os SPONGIOSUM INFERIUS.

A, The anterior part. B, The hook-like process for covering part of the antrum maxillare. C, A small process which covers part of the under end of the lacrymal groove. D, The inferior edge turned a little outwards.

FIG. 13. The internal surface of the Os SPONGIOSUM INFERIUS.

A, The anterior extremity. B, The upper edge which joins the superior maxillary and palate bones.

FIG. 14. The posterior and external surface of the right Os PALATI.

A, The orbital process. B, The nasal lamella. C, The pterygoid process. D, The palate process.

FIG. 15. The anterior and external surface of the right Os PALATI.

A, The orbital process. B, An opening through which the lateral nasal vessels and nerves pass. C, The nasal lamella. D, The pterygoid process. E, The posterior edge of the palate process for the connection of the velum palati. F, The inner edge by which the two ossa palati are connected.

FIG. 16. The right side of the VOMER.

A, The upper edge which joins the nasal lamella of the ethmoid bone and the middle cartilage of the nose. B, The inferior edge which is connected to the superior maxillary and palate bones. C, The superior and posterior part which receives the processus azygos of the sphenoid bone.

FIG. 17. The MAXILLA INFERIOR.

A, The chin. B, The base and left side. C, The angle. D, The coronoid process. E, The condyloid process. F, The beginning of the inferior maxillary canal of the right side, for the entry of the nerve and blood-vessels. G, The termination of the left canal. H, The two dentes incisores. I, The dens caninus. K, The two small molares. L, The three large molares.

FIG. 18. The different classes of the TEETH.

1, 2, A fore and back view of the two anterior dentes incisores of the lower jaw. 3, 4, Similar teeth of the upper jaw. 5, 6, A fore and back view of the dentes canini. 7, 8, The anterior dentes molares. 9, 10, 11, The posterior dentes molares. 12, 13, 14, 15,

Osteology 15, 16, Unusual appearances in the shape and size of the teeth.

FIG. 19. The external surface of the Os HYOIDES.
A, The body. BB, The cornua. CC, The appendices.

PLATE XX.

FIG. 1. A Posterior View of the STERNUM and CLAVICLES, with the ligament connecting the clavicles to each other.

a, The posterior surface of the sternum. b b, The broken ends of the clavicles. c c c c, The tubercles near the extremity of each clavicle. d, The ligament connecting the clavicles.

FIG. 2. A Fore-view of the LEFT SCAPULA, and of a half of the CLAVICLE, with their Ligaments.

a, The spine of the scapula. b, The acromion. c, The inferior angle. d, Inferior costa. e, Cervix. f, Glenoid cavity, covered with cartilage for the arm-bone. g g, The capsular ligament of the joint. h, Coracoid process. i, The broken end of the clavicle. k, Its extremity joined to the acromion. l, A ligament coming out single from the acromion to the coracoid process. m, A ligament coming out single from the acromion, and dividing into two, which are fixed to the coracoid process.

FIG. 3. The Joint of the Elbow of the LEFT ARM, with the Ligaments.

a, The os humeri. b, Its internal condyle. c c, The two prominent parts of its trochlea appearing through the capsular ligament. d, The ulna. e, The radius. f, The part of the ligament including the head of the radius.

FIG. 4. The Bones of the RIGHT-HAND, with the PALM in view.

a, The radius. b, The ulna. c, The scaphoid bone of the carpus. d, The os lunare. e, The os cuneiforme. f, The os pisiforme. g, Trapezium. h, Trapezoides. i, Capitulatum. k, Unciforme. l, The four metacarpal bones of the fingers. m, The first phalanx. n, The second phalanx. o, The third phalanx. p, The metacarpal bone of the thumb. q, The first joint. r, The second joint.

FIG. 5. The Posterior View of the Bones of the LEFT HAND.

The explication of Fig. 4. serves for this figure; the same letters pointing out the same bones, though in a different view.

FIG. 6. The Upper Extremity of the TIBIA, with the Semilunar Cartilages of the Joint of the Knee, and some Ligaments.

a, The strong ligament which connect the rotula to the tubercle of the tibia. b b, The parts of the extremity of the tibia, covered with cartilage, which appear within the semilunar cartilages. c c, The semilunar cartilages. d, The two parts of what is called the cross ligament.

FIG. 7. The Posterior View of the Joint of the RIGHT KNEE.

a, The os femoris cut. b, Its internal condyle. c, Its external condyle. d, The back-part of the tibia.

Osteology. e, The superior extremity of the fibula. f, The edge of the internal semilunar cartilage. g, An oblique ligament. h, A larger perpendicular ligament. i, A ligament connecting the femur and fibula.

FIG. 8. The Anterior View of the Joint of the RIGHT KNEE.

b, The internal condyle. c, Its external condyle. d, The part of the os femoris, on which the patella moves. e, A perpendicular ligament. f f, The two parts of the crucial ligaments. g g, The edges of the two moveable semilunar cartilages. h, The tibia. i, The strong ligament of the patella. k, The back part of it where the fat has been dissected away. l, The external depression. m, The internal one. n, The cut tibia.

FIG. 9. A View of the Inferior Part of the Bones of the RIGHT FOOT.

a, The great knob of the os calcis. b, A prominence on its outside. c, The hollow for the tendons, nerves, and blood-vessels. d, The anterior extremity of the os calcis. e, Part of the astragalus. f, Its head covered with cartilage. g, The internal prominence of the os naviculare. h, The os cuboides. i, The os cuneiforme internum; k, —Medium; l, —Externum. m, The metatarsal bones of the four lesser toes. n, The first—o, The second—p, The third phalanx of the four lesser toes. q, The metatarsal bones of the great toe. r, Its first—s, Its second joint.

FIG. 10. The Inferior Surface of the two large SESA-MOID BONES, at the first Joint of the Great Toe.

FIG. 11. The Superior View of the Bones of the RIGHT FOOT.

a, b, as in Fig. 9. c, The superior head of the astragalus. d, &c. as in Fig. 9.

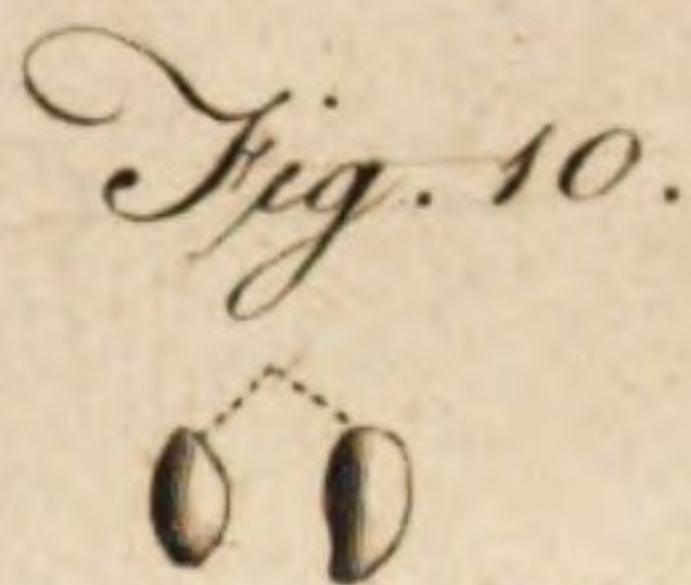
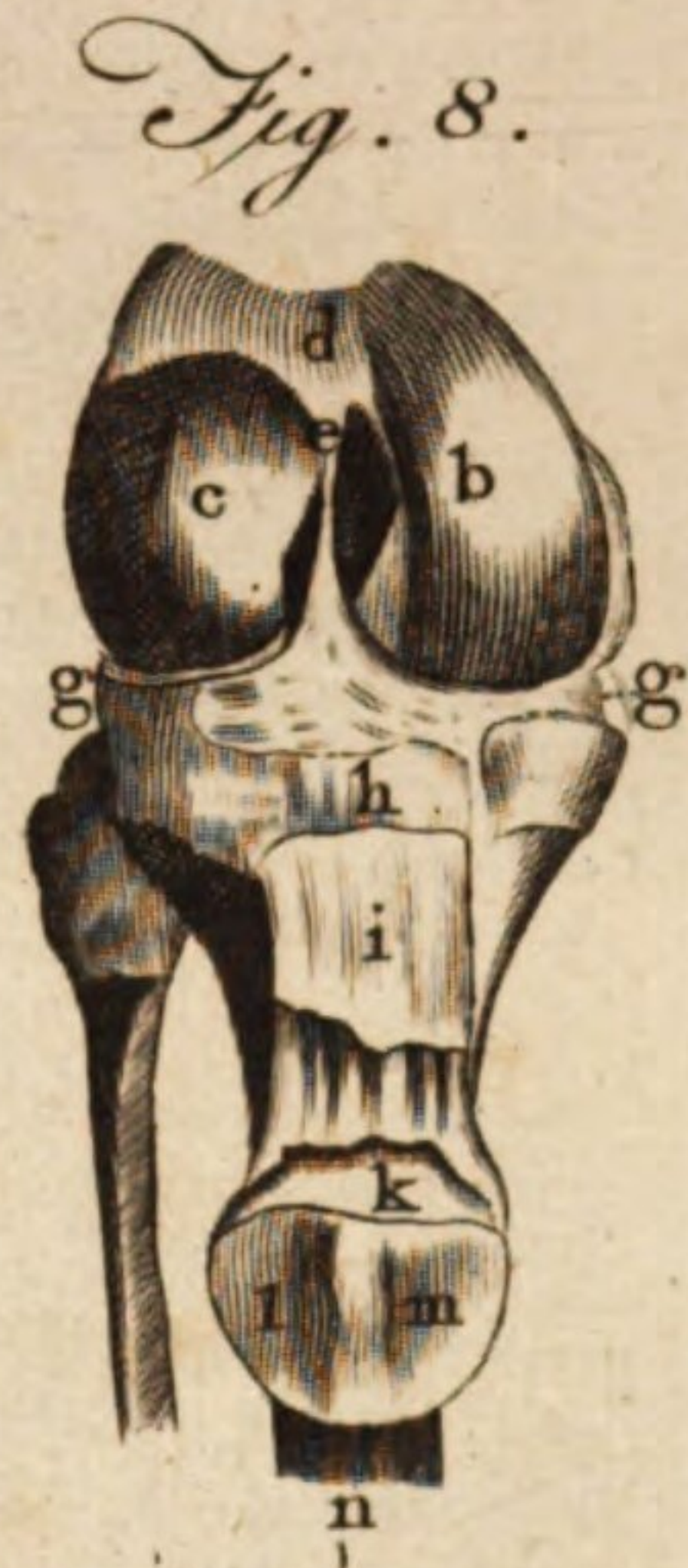
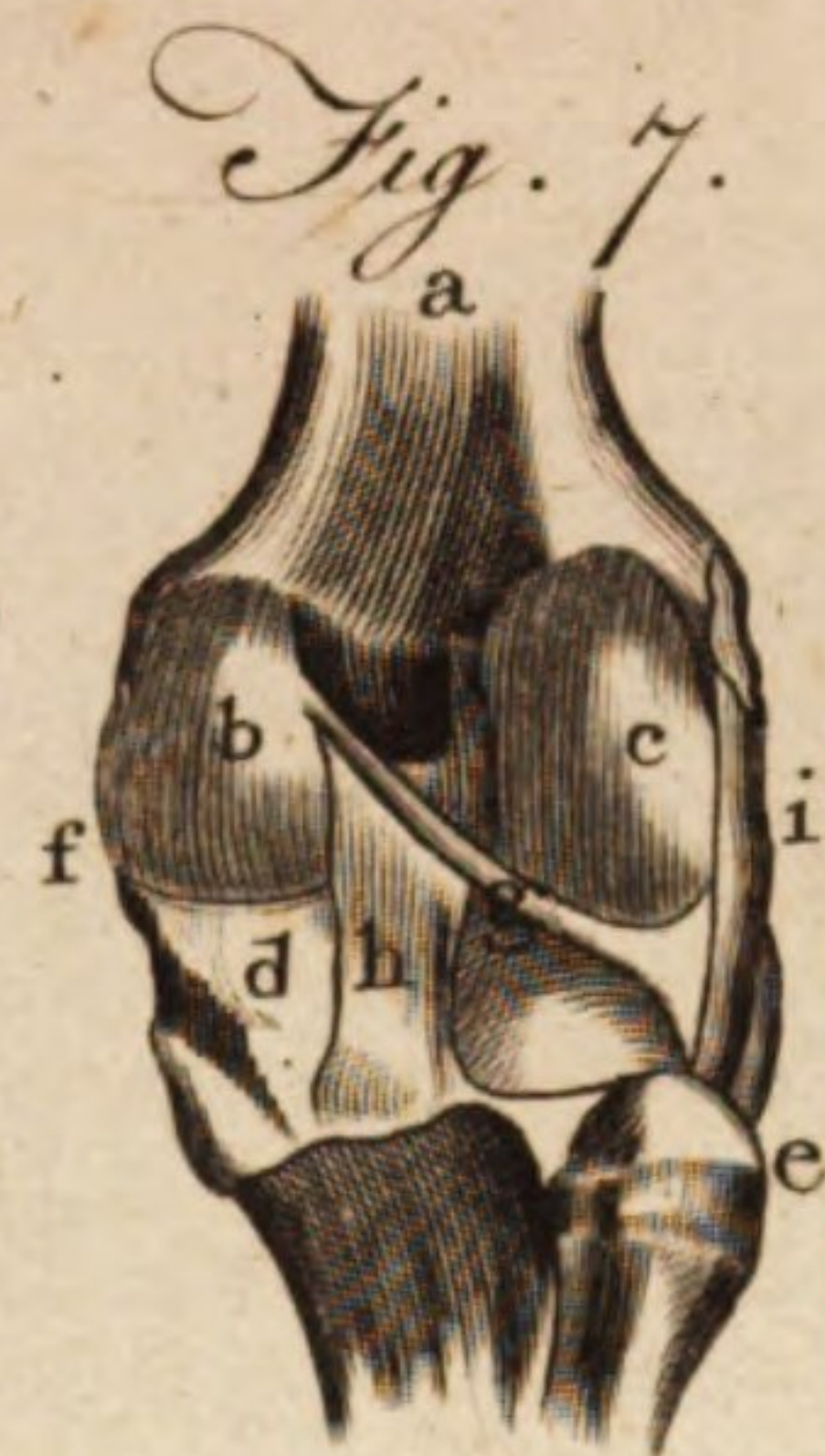
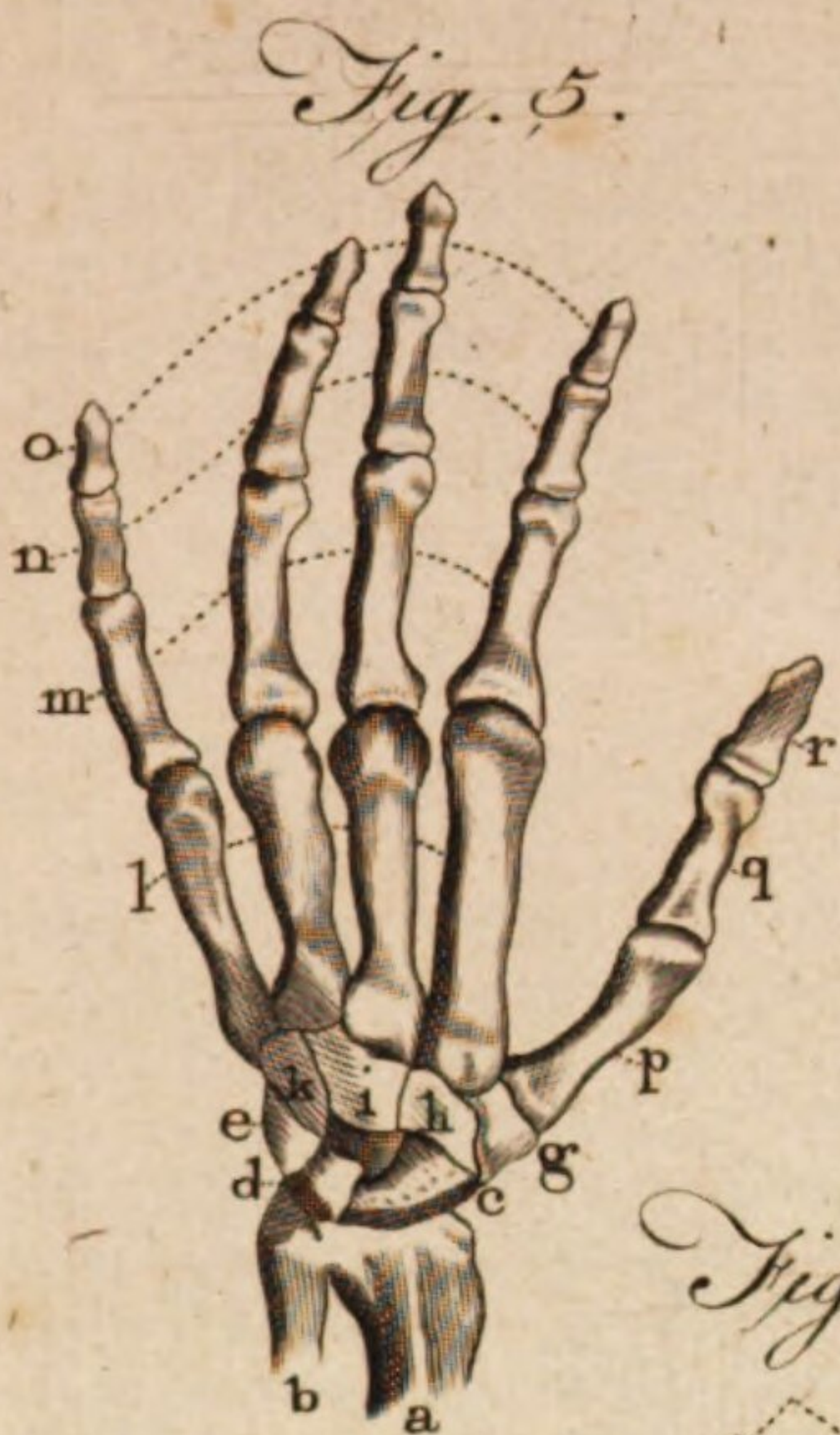
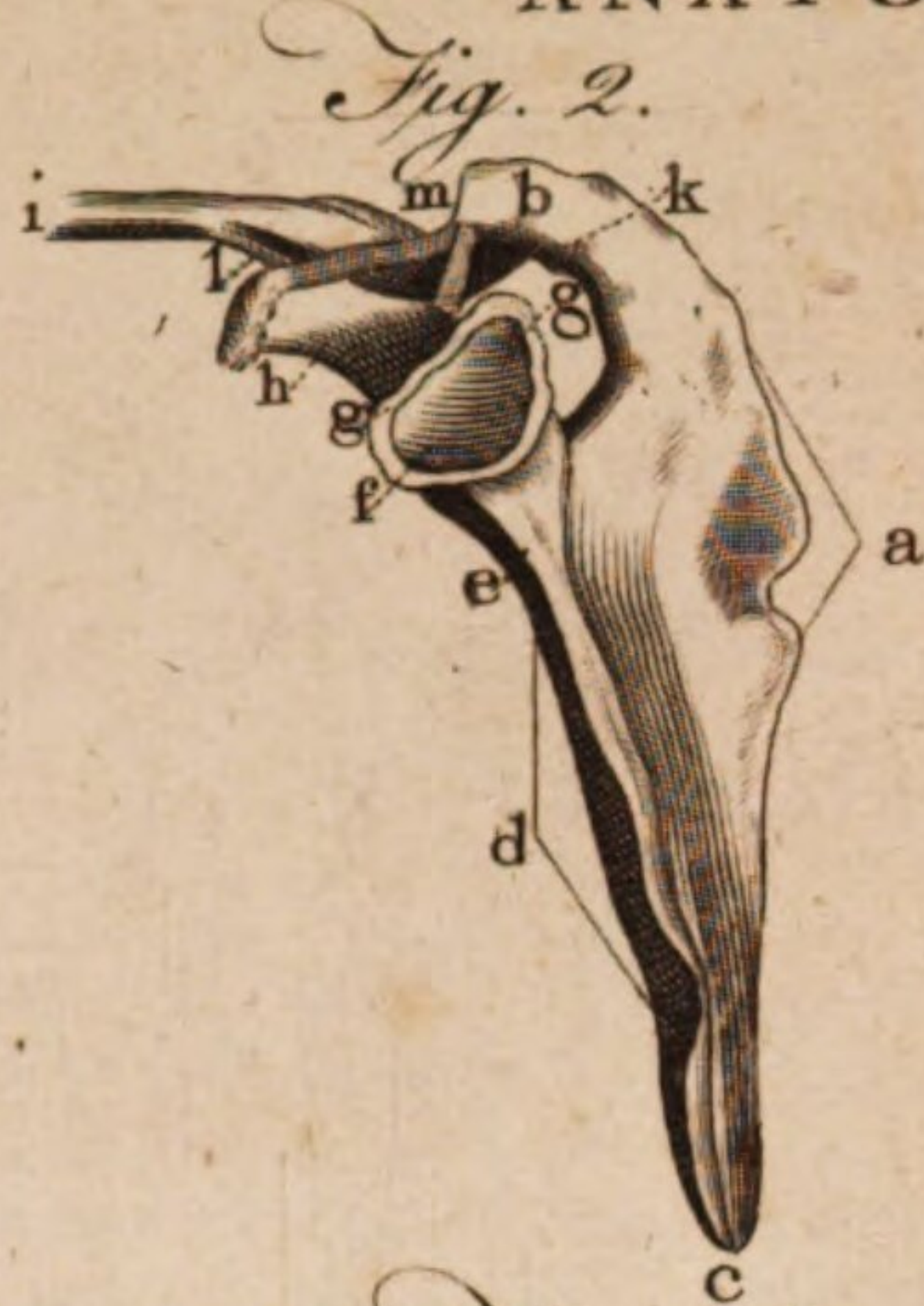
FIG. 12. The View of the SOLE of the Foot, with its Ligaments.

a, The great knob of the os calcis. b, The hollow for the tendons, nerves, and blood vessels. c, The sheaths of the flexores pollicis and digitorum longi opened. d, The strong cartilaginous ligament supporting the head of the astragalus. e, h, Two ligaments which unite into one, and are fixed to the metatarsal bone of the great toe. f, A ligament from the knob of the os calcis to the metatarsal bone of the little toe. g, A strong triangular ligament, which supports the bones of the tarsus. i, The ligaments of the joints of the five metatarsal bones.

FIG. 13. a, The head of the thigh bone of a child. b, The ligamentum rotundum connecting it to the acetabulum. c, The capsular ligament of the joint with its arteries injected. d, The numerous vessels of the mucilaginous gland injected.

FIG. 14. The Back-view of the Cartilages of the LARYNX, with the Os HYOIDES.

a, The posterior part of the base of the os hyoides. b b, Its cornua. c, The appendix of the right side. d, A ligament sent out from the appendix of the left side, to the styloid process of the temporal bone. e, The union of the base with the left cornu. f f, The posterior sides of (g) the thyroid cartilage. h h, Its superior



Osteology. superior cornua. i i, Its inferior cornua. k, The cricoid cartilage. l l, The arytenoid cartilages. m, The entry into the lungs, named *glottis*. n, The epiglottis. o o, The superior cartilages of the trachea. p, Its ligamentous back-part.

Osteology. FIG. 15. The Superior Concave Surface of the SESAMOID BONES at the first joint of the Great Toe, with their Ligaments.

a, Three sesamoid bones. b, The ligamentous substance in which they are formed.

PART II OF THE SOFT PARTS IN GENERAL;
OF THE COMMON INTEGUMENTS, WITH THEIR APPENDAGES;
AND OF THE MUSCLES.

73.

ANATOMICAL writers usually proceed to a description of the muscles after having finished the osteology; but we shall deviate a little from the common method, with a view to describe every thing clearly and distinctly, and to avoid a tautology which would otherwise be unavoidable. All the parts of the body are so intimately connected with each other, that it seems impossible to convey a just idea of any one of them, without being in some measure obliged to say something of others; and on this account we wish to mention in this place the names and situation of the principal viscera of the body, that when mention is hereafter made of any one of them in the course of the work, the reader may at least know where they are placed.

After this little digression, the common integuments, and after them the muscles, will be described; we then propose to enter into an examination of the several viscera and their different functions. In describing the brain, occasion will be taken to speak of the nerves and animal spirits. The circulation of the blood will follow the anatomy of the heart, and the secretions and other matters will be introduced in their proper places.

The body is divided into three great cavities. Of these the uppermost is formed by the bones of the cranium, and incloses the brain and cerebellum.

The second is composed of the vertebræ of the back, the sternum, and true ribs, with the additional assistance of muscles, membranes, and common integuments, and is called the *thorax*—It contains the heart and lungs.

The third, and inferior cavity, is the abdomen. It is separated from the thorax by means of the diaphragm, and is formed by the lumbar vertebræ, the os sacrum, the ossa innominata, and the false ribs, to which we may add the peritonæum, and a variety of muscles. This cavity incloses the stomach, intestines, omentum or cawl, liver, pancreas, spleen, kidneys, urinary bladder, and parts of generation.

Under the division of common integuments, are usually included the epidermis, or scarf-skin, the reticulum mucosum of Malpighi, the cutis or true skin, and the membrana adiposa.—The hair and nails, as well as the sebaceous glands, may be considered as appendages to the skin.

SECT. I. Of the SKIN.

§ 1. Of the SCARF-skin.

74
Cuticula.

THE epidermis, cuticula, or scarf-skin, is a fine, transparent, and insensible pellicle, destitute of nerves and blood vessels, which invests the body, and every where

covers the true skin. This scarf-skin, which seems to be very simple, appears, when examined with a microscope, to be composed of several laminæ or scales which are increased by pressure, as we may observe in the hands and feet, where it is frequently much thickened, and becomes perfectly callous. It seems to adhere to the cutis by a number of very minute filaments, but may easily be separated from it by heat, or by maceration in water. Some anatomical writers have supposed that it is formed by a moisture exhaled from the whole surface of the body, which gradually hardens when it comes into contact with the air. They were perhaps induced to adopt this opinion, by observing the speedy regeneration of this part of the body when it has been by any means destroyed, it appearing to be renewed on all parts of the surface at the same time; whereas other parts which have been injured, are found to direct their growth from their circumference only towards their centre. But a demonstrative proof that the epidermis is not a fluid hardened by means of the external air, is, that the fœtus in utero is found to have this covering. Leeuwenhoek supposed its formation to be owing to the expansion of the extremities of the excretory vessels, which are found everywhere upon the surface of the true skin. Ruysch attributed its origin to the nervous papillæ of the skin; and Heister thinks it probable, that it may be owing both to the papillæ and the excretory vessels. The celebrated Morgagni, on the other hand, contends*, that it is nothing more than the surface of the cutis, hardened and rendered insensible by the liquor amnii in utero, and by the pressure of the air. This is a subject, however, on which we can advance nothing with certainty.

The cuticle is pierced with an infinite number of pores, or little holes, which afford a passage to the hairs, sweat, and insensible perspiration, and likewise to warm water, mercury, and whatever else is capable of being taken in by the absorbents of the skin. The lines which we observe on the epidermis belong to the true skin. The cuticle adjusts itself to them, but does not form them.

§ 2. Of the Rete Mucosum.

BETWEEN the epidermis and cutis we meet with an appearance to which Malpighi, who first described it, gave the name of *rete mucosum*, supposing it to be of a membranous structure, and pierced with an infinite number of pores; but the fact is, that it seems to be nothing more than a mucous substance which may be dissolved by macerating it in water, while the cuticle and cutis preserve their texture.

4 T 2

The

* *Adversar.
Anat. II.
Animadver.
2.*

75
Rete mu-
cosum.

Of the
Integuments, &c.

The colour of the body is found to depend on the colour of this rete mucosum; for in negroes it is observed to be perfectly black, whilst the true skin is of the ordinary colour.

The blisters which raise the skin when burnt or scalded, have been supposed by some to be owing to a rarefaction of this mucus; but they are more probably occasioned by an increased action of the vessels of the part, together with an afflux and effusion of the thinner parts of the blood.

§ 3. Of the CUTIS, or True Skin.

76
Cutis.

THE cutis is composed of fibres closely compacted together, as we may observe in leather which is the prepared skin of animals. These fibres form a thick network, which every where admits the filaments of nerves, and an infinite number of blood-vessel and lymphatics.

The cutis, when the epidermis is taken off, is found to have, throughout its whole surface, innumerable papillæ, which appear like very minute granulations, and seem to be calculated to receive the impressions of the touch, being the most easily observed where the sense of feeling is the most delicate, as in the palms of the hands and on the fingers.

These papillæ are supposed by many anatomical writers to be continuations of the pulpy substance of nerves, whose coats have terminated in the cellular texture of the skin. The great sensibility of these papillæ evidently proves them to be exceedingly nervous; but surely the nervous fibrillæ of the skin are of themselves scarcely equal to the formation of these papillæ, and it seems to be more probable that they are formed like the rest of the cutis.

These papillæ being described, the uses of the epidermis and the reticulum mucosum will be more easily understood; the latter serving to keep them constantly moist, while the former protects them from the external air, and modifies their too great sensibility.

§ 4. Of the GLANDS of the Skin

77
The sebaceous glands.

IN different parts of the body we meet, within the substance of the skin, with certain glands or follicles, which discharge a fat and oily humour that serves to lubricate and soften the skin. When the fluid they secrete has acquired a certain degree of thickness, it approaches to the colour and consistence of suet; and from this appearance they have derived their name of *sebaceous glands*. They are found in the greatest number in the nose, ear, nipple, axilla, groin, scrotum, vagina, and prepuce.

Besides these sebaceous glands, we read, in anatomical books, of others that are described as small spherical bodies placed in all parts of the skin, in much greater abundance than those just now mentioned, and named *miliary*, from their supposed resemblance to millet-seed. Steno, who first described these glands, and Malpighi,

Ruyfch, Verheyen, Winslow, and others, who have adopted his opinions on this subject, speak of them as having excretory ducts, that open on the surface of the cuticle, and distil the sweat and matter of insensible perspiration; and yet, notwithstanding the positive manner in which these pretended glands have been spoken of, we are now sufficiently convinced that their existence is altogether imaginary.

§ 5. Of the INSENSIBLE Perspiration and SWEAT.

THE matter of insensible perspiration, or in other words, the subtile-vapour that is continually exhaling from the surface of the body, is not secreted by any particular glands, but seems to be derived wholly from the extremities of the minute arteries that are everywhere dispersed through the skin. These exhaling vessels are easily demonstrated in the dead subject, by throwing water into the arteries; for then small drops exude from all parts of the skin, and raise up the cuticle, the pores of which are closed by death; and in the living subject, a looking-glass placed against the skin, is soon obscured by the vapour. Bidloo fancied he had discovered ducts leading from the cutis to the cuticle, and transmitting this fluid; but in this he was mistaken.

When the perspiration is by any means increased, and several drops that were insensible when separate, are united together and condensed by the external air, they form upon the skin small but visible drops called *sweat* (N). This particularly happens after much exercise, or whatever occasions an increased determination of fluids to the surface of the body; a greater quantity of perspirable matter being in such cases carried thro' the passages that are destined to convey it off.

It has been disputed, indeed, whether the insensible perspiration and sweat are to be considered as one and the same excretion, differing only in degree; or whether they are two distinct excretions derived from different sources. In support of the latter opinion, it has been alledged, that the insensible perspiration is agreeable to nature, and essential to health, whereas sweat may be considered as a species of disease. But this argument proves nothing; and it seems probable, that both the insensible vapour and the sweat are exhaled in a similar manner, though they differ in quantity, and probably in their qualities; the former being more limpid, and seemingly less impregnated with salts than the latter: at any rate we may consider the skin as an emunctory through which the redundant water, and sometimes the other more saline parts of the blood, are carried off. But the insensible perspiration is not confined to the skin only--a great part of what we are constantly throwing off in this way is from the lungs. The quantity of fluid exhaled from the human body by this insensible perspiration is very considerable. Sanctorius (O) an Italian physician, who indefatigably passed a great many

(N) Leeuwenhoeck asserts, that one drop of sweat is formed by the conflux of 15 drops of perspirable vapour.

(O) The insensible perspiration is sometimes distinguished by the name of this physician, who was born in the territories of Venice, and was afterwards a professor in the university of Padua. After estimating the aliment he took in, and the sensible secretions and discharges, he was enabled to ascertain with great accuracy the weight or quantity of insensible perspiration by means of a statical chair which he contrived for this purpose; and

Of the
Integuments, &c.

many years in a series of statical experiments, demonstrated long ago what has been confirmed by later observations, that the quantity of vapour exhaled from the skin and from the surface of the lungs, amounts nearly to 5-8ths of the aliment we take in. So that if in the warm climate of Italy a person eats and drinks the quantity of eight pounds in the course of a day, five pounds of it will pass off by insensible perspiration, while three pounds only will be evacuated by stool, urine, saliva, &c. But in countries where the degree of cold is greater than in Italy, the quantity of perspired matter is less; in some of the more northern climates, it being found not to equal the discharge by urine. It is likewise observed to vary according to the season of the year, and according to the constitution, age, sex, diseases, diet, exercise, passions, &c. of different people.

From what has been said on this subject, it will be easily conceived, that this evacuation cannot be either much increased or diminished in quantity without affecting the health.

The perspirable matter and the sweat are in some measure analogous to the urine, as appears from their taste and saline nature (p). And it is worthy of observation, that when either of these secretions is increased in quantity, the other is diminished; so that they who perspire the least, usually pass the greatest quantity of urine, and vice versa.

§ 6. Of the NAILS.

81
The nails.

THE nails are of a compact texture, hard and transparent like horn. Their origin is still a subject of dispute. Malpighi supposed them to be formed by a continuation of the papillæ of the skin: Ludwig, on the other hand, maintained, that they were composed of the extremities of blood-vessels and nerves; both these opinions are now deservedly rejected.

They seem to possess many properties in common with the cuticle; like it they are neither vascular nor sensible, and when the cuticle is separated from the true skin by maceration or other means, the nails come away with it.

They appear to be composed of different layers, of unequal size, applied one over the other. Each layer seems to be formed of longitudinal fibres.

In each nail we may distinguish three parts, viz. the root, the body or middle, and the extremity. The root is a soft, thin, and white substance, terminating in the form of a crescent; the epidermis adheres very

strongly to this part; the body of the nail is broader, redder, and thicker, and the extremity is of still greater firmness.

The nails increase from their roots, and not from their upper extremity.

Their principal use is to cover and defend the ends of the fingers and toes from external injury.

§ 7. Of the HAIR.

82
The hair. THE hairs, which from their being generally known do not seem to require any definition, arise from distinct capsules or bulbs seated in the cellular membrane under the skin (q). Some of these bulbs inclose several hairs. They may be observed at the roots of the hairs which form the beard or whiskers of a cat.

The hairs, like the nails, grow only from below by a regular propulsion from their root, where they receive their nourishment. Their bulbs, when viewed with a microscope, are found to be of various shapes. In the head and scrotum they are roundish; in the eye-brows they are oval; in the other parts of the body they are nearly of a cylindrical shape. Each bulb seems to consist of two membranes, between which there is a certain quantity of moisture. Within the bulb the hair separates into three or four fibrillæ; the bodies of the hairs, which are the parts without the skin, vary in softness and colour according to the difference of climate, age, or temperament of body (r).

Their general use in the body does not seem to be absolutely determined; but hairs in particular parts, as on the eye-brows and eye-lids, are destined for particular uses, which will be mentioned when those parts are described.

§ 8. Of the CELLULAR MEMBRANE and FAT.

83
Cellular membrane. THE cellular membrane is found to invest the most minute fibres we are able to trace; so that by modern physiologists, it is very properly considered as the universal connecting medium of every part of the body.

It is composed of an infinite number of minute cells united together, and communicating with each other. The two diseases peculiar to this membrane are proofs of such a communication; for in the *emphysema* all its cells are filled with air, and in the *anasarca* they are universally distended with water. Besides these proofs of communication from disease, a familiar instance of it may be observed amongst butchers, who usually puncture this membrane, and by inflating it with air add to the good appearance of their meat.

The

and from his experiments, which were conducted with great industry and patience, he was led to determine what kinds of solid or liquid aliment increased or diminished it. From these experiments he formed a system, which he published at Venice in 1614, in the form of aphorisms, under the title of "*Ars de Medicina Statica*."

(p) Minute crystals have been observed to shoot upon the cloaths of men who work in glass-houses. *Haller. Elem. Phys.*

(q) Malpighi, and after him the celebrated Ruysch, supposed the hairs to be continuations of nerves, being of opinion that they originated from the papillæ of the skin, which they considered as nervous; and as a corroborating proof of what they advanced, they argued the pain we feel in plucking them out; but later anatomists seem to have rejected this doctrine, and consider the hairs as particular bodies, not arising from the papillæ (for in the parts where the papillæ abound most there are no hairs), but from bulbs or capsules, which are peculiar to them.

(r) The hairs likewise differ from each other, and may not be improperly divided into two classes; one of which may include the hair of the head, chin, pubes, and axillæ; and the other, the softer hairs, which are to be observed almost everywhere on the surface of the body.

The cells of this membrane serve as reservoirs to the oily part of the blood or *Fat*, which seems to be deposited in them, either by transfusion through the coats of the arteries that ramify through these cells, or by particular vessels, continued from the end of arteries. These cells are not of a glandular structure, as Malpighi and others after him have supposed. The fat is absorbed and carried back into the system by the lymphatics. The great waste of it in many diseases, particularly in the consumption, is a sufficient proof that such an absorption takes place.

The fulness and size of the body are in a great measure proportioned to the quantity of fat contained in the cells of this membrane.

In the living body it seems to be a fluid oil, which concretes after death. In graminivorous animals, it is found to be of a firmer consistence than in man.

The fat is not confined to the skin alone, being met with every where in the interstices of muscles, in the omentum, about the kidneys, at the basis of the heart, in the orbits, &c.

The chief uses of the fat seem to be to afford moisture to all the parts with which it is connected; to facilitate the action of the muscles; and to add to the beauty of the body, by making it every where smooth and equal.

SECT. II. Of the MUSCLES.

85. The muscles are the organs of motion. The parts that are usually included under this name consist of distinct portions of flesh, susceptible of contraction and relaxation; the motions of which, in a natural and healthy state, are subject to the will, and for this reason they are called *voluntary* muscles. But besides these, there are other parts of the body that owe their power of contraction to their muscular fibres; thus the heart is of a muscular texture, forming what is called a *hollow* muscle; and the urinary bladder, stomach, intestines, &c. are enabled to act upon their contents, merely because they are provided with muscular fibres. These are called *involuntary* muscles, because their motions are not dependent on the will. The muscles of respiration, being in some measure influenced by the will, are said to have a *mixed* motion.

The names by which the voluntary muscles are distinguished, are founded on their size, figure, situation, use, or the arrangement of their fibres, or their origin and insertion. But besides these particular distinctions, there are certain general ones that require to be noticed. Thus, if the fibres of a muscle are placed parallel to each other in a straight direction, they form what is styled a *rectilinear* muscle; if the fibres cross and intersect each other, they constitute a *compound* muscle; a *radiated* one, if the fibres are disposed in the manner of rays; or a *penniform* muscle, if, like the plume of a pen, they are placed obliquely with respect to the tendon.

Muscles that act in opposition to each other, are called *antagonists*; thus every extensor or muscle has a flexor for its antagonist, and *vice versa*. Muscles that concur in the same action are styled *congeneres*.

The muscles being attached to the bones, the latter may be considered as levers that are moved in different directions by the contraction of those organs.

That end of a muscle which adheres to the most fixed part is usually called the *origin*, and that which adheres to the more moveable part the *insertion*, of the muscle.

In every muscle we may distinguish two kinds of fibres; the one soft, of a red colour, sensible, and irritable, called *fleshy* fibres; the other of a firmer texture, of a white glistening colour, insensible, without irritability or the power of contracting, and named *tendinous* fibres. They are occasionally intermixed; but the fleshy fibres generally prevail in the belly or middle part of a muscle, and the tendinous ones in the extremities. If these tendinous fibres are formed into a round slender chord, they form what is called the *tendon* of the muscle; on the other hand, if they are spread into a broad flat surface, the extremity of the muscle is styled *aponeurosis*.

The tendons of many muscles, especially when they are long and exposed to pressure or friction in the grooves formed for them in the bones, are surrounded by a tendinous sheath or *fascia*, in which we sometimes find a small mucous sac or *bursa mucosa*, which obviates any inconvenience from friction. Sometimes we find whole muscles, and even several muscles, covered by a fascia of the same kind, that affords origin to many of their fibres, dipping down between them, adhering to the ridges of bones, and thus preventing them from swelling too much when in action. The most remarkable instance of such a covering is the *fascia lata* of the thigh.

Each muscle is inclosed by a thin covering of cellular membrane, which has been sometimes improperly considered as peculiar to the muscles, and described under the name of *propria membrana musculosa*. This cellular covering dips down into the substance of the muscle, connecting and surrounding the most minute fibres we are able to demonstrate, and affording a support to their vessels and nerves.

Leeuwenhoek fancied he had discovered, by means of his microscope, the ultimate division of a muscle, and that he could point out the simple fibre, which appeared to him to be an hundred times less than a hair; but he was afterwards convinced how much he was mistaken on this subject, and candidly acknowledged, that what he had taken for a simple fibre was in fact a bundle of fibres.

It is easy to observe several of these fasciculi or bundles, in a piece of beef, in which, from the coarseness of its texture, they are very evident.

The red colour which so particularly distinguishes the muscular or fleshy parts of animals, is owing to an infinite number of blood-vessels that are dispersed through their substance. When we macerate the fibres of a muscle in water, it becomes of a white colour like all other parts of the body divested of their blood. The blood-vessels are accompanied by nerves, and they are both distributed in such abundance to these parts, that in endeavouring to trace the course of the blood-vessels in a muscle, it would appear to be formed altogether by their ramifications; and in an attempt to follow the branches of its nerves, they would be found to be equal in proportion.

If a muscle is pricked or irritated, it immediately contracts. This is called its irritable principle; and this

Of the
Muscles86
Of the vis
instita.

this irritability is to be considered as the characteristic of muscular fibres, and may serve to prove their existence in parts that are too minute to be examined by the eye. This power, which disposes the muscles to contract when stimulated, independent of the will, is supposed to be inherent in them; and is therefore named *vis insita*. This property is not to be confounded with elasticity, which the membranes and other parts of the body possess in a greater or less degree in common with the muscles; nor with sensibility, for the heart, though the most irritable, seems to be the least sensible of any of the muscular parts of the body.

After a muscular fibre has contracted, it soon returns to a state of relaxation, till it is excited afresh, and then it contracts and relaxes again. We may likewise produce such a contraction, by irritating the nerve leading to a muscle, although the nerve itself is not affected.

This principle is found to be greater in small than in large, and in young than in old, animals.

In the voluntary muscles these effects of contraction and relaxation of the fleshy fibres are produced in obedience to the will, by what may be called the *vis nervosa*, a property that is not to be confounded with the *vis insita*. As the existence of a *vis insita* different from a *vis nervosa*, was the doctrine taught by Doctor Haller in his *Elem. Phys.* but is at present called in question by several, particularly Doctor Monro, we think it necessary to give a few objections, as stated in his *Observations on the Nervous System*:

87
The vis
nervosa.

"The chief experiment (says the Doctor) which seems to have led Dr Haller to this opinion, is the well-known one, that the heart and other muscles, after being detached from the brain, continue to act spontaneously, or by stimuli may be roused into action for a considerable length of time; and when it cannot be alleged, says Dr Haller, that the nervous fluid is by the mind, or otherwise, impelled into the muscle.

"That in this instance, we cannot comprehend by what power the nervous fluid or energy can be put in motion, must perhaps be granted: But has Dr Haller given a better explanation of the manner in which his supposed *vis insita* becomes active?

"If it be as difficult to point out the cause of the action of the *vis insita* as that of the action of the *vis nervosa*, the admission of that new power, instead of relieving, would add to our perplexity.

"We should then have admitted, that two causes of a different nature were capable of producing exactly the same effect; which is not in general agreeable to the laws of nature.

"We should find other consequences arise from such an hypothesis, which tend to weaken the credibility of it. For instance, if in a sound animal the *vis nervosa* alone produces the contraction of the muscles, we will ask what purpose the *vis insita* serves? If both operate, are we to suppose that the *vis nervosa*, impelled by the mind or living principle, gives the order, which the *vis insita* executes, and that the nerves are the intermediaries; and so admit two wise agents employed in every the most simple action? But instead of speculating farther, let us learn the effect of experiments, and endeavour from these to draw plain conclusions.

"1. When I poured a solution of opium in water under the skin of the leg of a frog, the muscles, to the surface of which it was applied, were very soon deprived of the power of contraction. In like manner, when I poured this solution into the cavity of the heart, by opening the vena cava, the heart was almost instantly deprived of its power of motion, whether the experiment was performed on it fixed in its place, or cut out of the body.

"2. I opened the thorax of a living frog; and then tied or cut its aorta, so as to put a stop to the circulation of its blood.

"I then opened the vena cava, and poured the solution of opium into the heart; and found, not only that this organ was instantly deprived of its powers of action, but that in a few minutes the most distant muscles of the limbs were extremely weakened. Yet this weakness was not owing to the want of circulation, for the frog could jump about for more than an hour after the heart was cut out.

"In the first of these two experiments, we observe the supposed *vis insita* destroyed by the opium; in the latter, the *vis nervosa*; for it is evident that the limbs were affected by the sympathy of the brain, and of the nervous system in general, with the nerves of the heart.

"3. When the nerve of any muscle is first divided by a transverse section, and then burnt with a hot iron, or punctured with a needle, the muscle in which it terminates contracts violently, exactly in the same manner as when the irritation is applied to the fibres of the muscle. But when the hot iron, or needle, is confined to the nerve, Dr Haller himself must have admitted, that the *vis nervosa*, and not the *vis insita*, was excited. But here I would ask two questions.

"First, Whether we do not as well understand how the *vis nervosa* is excited when irritation is applied to the muscle as when it is applied to the trunk of the nerve, the impelling power of the mind seeming to be equally wanting in both cases?

"Secondly, If it appears that irritation applied to the trunk of a nerve excites the *vis nervosa*, why should we doubt that it can equally well excite it when applied to the small and very sensible branches and terminations of the nerve in the muscle?

"As, therefore, it appears that the supposed *vis insita* is destroyed or excited by the same means as the *vis nervosa*; nay, that when, by the application of opium to the heart of a frog, after the aorta is cut and the circulation interrupted, we have destroyed the *vis insita*, the *vis nervosa* is so much extinguished, that the animal cannot act with the distant muscles of the limb; and that these afterward grow very torpid, or lose much of their supposed *vis insita*; it seems clearly to follow, that there is no just ground for supposing that any other principle produces the contraction of a muscle."

The *vis nervosa*, or operation of the mind, if we may so call it, by which a muscle is brought into contraction, is not inherent in the muscle like the *vis insita*; neither is it perpetual, like this latter property. After long continued or violent exercise, for example, the

Of the
Integu-
ments, &c.

the voluntary muscles become painful, and at length incapable of further action; whereas the heart and other involuntary muscles, the motions of which depend solely on the *vis insita*, continue through life in a constant state of action, without any inconvenience or waste of this inherent principle.

The action of the *vis nervosa* on the voluntary muscles, constitutes what is called *muscular motion*; a subject that has given rise to a variety of hypotheses, many of them ingenious, but none of them satisfactory.

Borelli and some others have undertaken to explain the cause of contraction, by supposing that every muscular fibre forms as it were a chain of very minute bladders, while the nerves which are distributed through the muscle, bring with them a supply of animal spirits, which at our will fill these bladders, and by increasing their diameter in width, shorten them, and of course the whole fibre.

Borelli supposes these bladders to be of a rhomboidal shape; Bernouilli on the other hand contends that they are oval. Our countryman, Cowper, fancied he had filled them with mercury; the cause of this mistake was probably owing to the mercury's insinuating itself into some of the lymphatic vessels. The late ingenious Mr Elliot undertook to account for the phenomena of muscular motion on principles very different from those just now mentioned. He supposed that a dephlogisticated state of the blood is requisite for muscular action,

and that a communication of phlogiston to the blood is a necessary effect of such action.

We know that the muscular fibre is shortened, and that the muscle itself swells when in action; but how these phenomena are produced, we are unable to determine. We likewise know that the nerves are essential to muscular motion; for upon dividing or making a ligature round the nerve leading to a muscle, the latter becomes incapable of motion. A ligature made on the artery of a muscle produces a similar effect; a proof this, that a regular supply of blood is also equally necessary to muscular motion. The cause of palsy is usually not to be sought for in the muscle affected, but in the nerve leading to that muscle, or in that part of the brain or spinal marrow from which the nerve derives its origin.

Of the particular Muscles.

As the enumeration and description of the particular muscles must be dry and unentertaining to the generality of readers, yet cannot be altogether omitted in a work of this nature, it appeared eligible to throw this part of the subject into the form of a table; in which the name, origin, insertion, and principal use of each muscle, will be found described in few words, and occasionally its etymology when it is of Greek derivation or difficult to be understood.

A TABLE of the MUSCLES, arranged according to their SITUATION.

[N. B. This Table does not include all the muscles of the body; those belonging to the eyes, internal ear, intestinum rectum, and the male and female organs of generation, being described in other parts of the work. The reader will be pleased to observe likewise, that although all the muscles (a few only excepted) are in pairs, mention is here made only of the muscles of one side.]

MUSCLES situated under the integuments of the cranium	Name.	Origin.	Insertion.	Use.
	1. Occipito frontalis.	From the transverse ridge of the os occipitis.	Into the skin of the eye-brows.	To pull the skin of the head backwards, and to raise the eye brows and skin of the forehead.
	2. Corrugator supercilii.	From above the joining of the os frontis, os nasi, and os maxillare.	Into the inner part of the occipito-frontalis.	To draw the eyebrow towards each other, and to wrinkle the forehead.
of the eye-lids	1. Orbicularis palpebrarum.	From around the edge of the orbit.	Into the nasal process of the os maxillare.	To shut the eye.
	2. Levator palpebræ superioris.	From the bottom of the orbit, near the optic foramen.	Into the cartilage of the upper eye-lid.	To open the eye.
of the external ear	1. Attolens auriculam.	From the tendon of the occipito-frontalis near the os temporis.	Into the upper part of the ear.	To raise the ear.
	2. Anterior auriculæ.	From near the back part of the zygoma.	Into an eminence behind the helix.	To raise this eminence, and to pull it forwards.

3. Re-

Of the Muscles.	Name.	Origin.	Insertion.	Use.	Of the Muscles.
	3. Retrahentes (s) auriculæ.	From the outer and back part of the root of the mastoid process.	Into the convex part of the concha.	To stretch the concha, and pull the ear backwards.	
MUSCLES of the cartilages of the ear,	1. Tragicus.	From the outer and middle part of the concha, near the tragus.	Into the upper part of the tragus.	To depress the concha, and pull the point of the tragus a little outwards.	
	2. Anti-tragicus.	From the root of the inner part of the helix.	Into the upper part of the anti-tragus.	To dilate the mouth of the concha.	
	3. Transversus-auriculæ.	From the upper part of the concha.	Into the inner part of the helix.	To stretch the concha and scapha, and likewise to pull the parts it is connected with towards each other.	
	4. Helicis major.	From the upper, anterior, and acute part of the helix.	Into the cartilage of the helix, a little above the tragus.	To depress the upper part of the helix.	
	5. Helicis minor.	From the lower and fore part of the helix.	Into the helix, near the fissure in its cartilage.	To contract the fissure.	
_____ of the nose,	1. Compressor (τ) naris.	From the outer part of the root of the ala nasi.	Into the nasal process of the os maxillare, and anterior extremity of the os nasi.	To straighten the nostrils, and likewise to corrugate the skin of the nose.	
_____ of the mouth and lips,	1. Levator labii superioris, alæque nasi.	From the outer part of the orbital process of the os maxillare, and from the nasal process of that bone, where it joins the os frontis.	Into the upper lip and ala of the nose.	To draw the upper lip and skin of the nose upwards and outwards.	
	2. Levator anguli oris.	From the os maxillare superius, between the orbital foramen and the first dens molaris.	Into the orbicularis oris at the angle of the mouth.	To raise the corner of the mouth.	
	3. Zygomaticus major.	From the os malæ, near the zygomatic future.	Into the angle of the mouth.	To raise the angle of the mouth, and make the cheek prominent as in laughing.	
	4. Zygomaticus minor.	Immediately above the origin of the zyg. major.	Into the angle of the mouth.	To raise the angle of the mouth obliquely outwards.	
	5. Buccinator.	From the alveoli of the dentes molares in the upper and lower jaws.	Into the angle of the mouth.	To contract the mouth and draw the angle of it outwards and backwards.	
	6. Depressor labii superioris, alæque nasi.	From the os maxill. super. immediately above the gums of the dentes incisores.	Into the root of the ala nasi and upper lip.	To draw the ala nasi and upper lip downwards.	
			4 U	7. Depressor	

(s) These are three small slender muscles. The inferior one is sometimes wanting.
 (τ) The nose is affected by fibres of the occipito frontalis, and by several muscles of the face; but this pair, the compressores, is the only one that is proper to it.

	Name.	Origin.	Insertion.	Use.	Of the Muscles.
	7. Depressor anguli oris.	At the side of the chin from the lower edge of the maxilla inferior.	Into the angle of the mouth.	To draw the corner of the mouth downwards.	
	8. Depressor labii inferioris.	From the lower and anterior part of the maxilla inferior.	Into the under lip.	To draw the under lip downwards and somewhat outwards.	
	9. Levator labii inferioris.	From near the gums of the incisores and caninus of the maxilla inferior.	Into the under lip and skin of the chin.	To raise the under lip and skin of the chin.	
	10. Orbicularis Oris (v).			To shut the mouth by constringing the lips.	
Muscles of the lower jaw,	1. Temporalis.	From part of the os ptergmatidis and os frontis; squamous part of the os temporis; back part of the os maxillæ, and the temporal process of the os sphenoides (v).	Into the coronoid process of the lower jaw.	To move the lower jaw upwards.	
	2. Masseter (w).	From the malar process of the os maxillare, and the lower edges of the os maxillæ, and of the zygomatic process of the os temporis.	Into the basis of the coronoid process, and that part of the jaw which supports that and the condyloid process.	To raise and likewise to move the jaw a little forwards and backwards.	
	3. Pterygoideus internus.	From the inner surface of the outer wing of the pterygoid process of the os sphenoides, and from the process of the os palati that helps to form the pterygoid fossa.	Into the lower jaw on its inner side and near its angle.	To raise the lower jaw, and draw it a little to one side.	
	4. Pterygoideus externus.	From the external ala of the pterygoid process, a small part of the adjacent os maxillare, and a ridge in the temporal process of the os sphenoides.	Into the fore part of the condyloid process of the lower jaw, and likewise of the capsular ligament.	To move the jaw forwards and to the opposite side (x); and at the same time to prevent the ligament of the joint from being pinched.	
— situated at the fore part of the neck,	1. Latissimus colli (v).	From the cellular membrane covering	Into the side of the chin and integu-	To draw the cheeks and skin of the face	

(v) This muscle is in a great measure, if not wholly, formed by the buccinator, zygomatici, depressores, and other muscles that move the lips. Its fibres surround the mouth like a ring.

(v) Some of its fibres likewise have their origin from a strong fascia that covers the muscle and adheres to the bone round the whole circumference of its origin. When we remove this covering, we find the muscle of a semicircular shape with its radiated fibres, converging and forming a strong middle tendon.

(w) So called from its use in chewing, its derivation being from *μασσωμαι*, *manduco*, "to eat."

(x) This happens when the muscle acts singly. When both act, the jaw is brought horizontally forwards.

(y) This broad and thin muscular expansion, which is situated immediately under the common integuments, is by Winslow named *musculus cutaneus*. Galen gave it the name of *πλατυσμα μυοειδης* (*Platysma-myoides*); the etymology of which is from *πλατυσμος*, *dilatatio*, and *μυς*, *musculus*, and *ειδος*, *forma*.

Name.

Origin.

Insertion.

Use.

Of the
Muscles.the pectoral, del-
toid, and trapezius
muscles.

ments of the cheek.

downwards; and
when the mouth is
shut, to draw all
that part of the skin
to which it is con-
nected below the
lower jaw upwards.

2. Mastoideus (z).

From the upper part
of the sternum, and
from the upper and
fore part of the
clavicle.Into the mastoid pro-
cess, and as far back
as the lambdoidal
suture.To move the head to
one side, or when
both muscles act, to
bend it forwards.MUSCLES situated be-
tween the trunk
and the os hyoides, 1. Omo-hyoideus (A).

1. Omo-hyoideus (A).

From the upper costa
of the scapula near
its niche; from part
of a ligament that
extends across this
niche, and some-
times by a few fi-
bres, from the co-
racoid process.Into the basis of the
os hyoides.To draw the os hyoi-
des in an oblique di-
rection downwards.

2. Sterno-hyoideus.

From the cartilage of
the first rib, the in-
ner and upper part
of the sternum, and
a small part of the
clavicle.Into the basis of the
os hyoides.To draw the os hyoi-
des downwards.

3. Hyo-thyroideus.

From part of the ba-
sis and horn of the
os hyoides.Into a rough oblique
line at the side of
the thyroid carti-
lage.To raise the thyroid
cartilage, or depress
the os hyoides.

4. Sterno-thyroideus.

From between the
cartilages of the 1st
and 2d ribs, at the
upper and inner
part of the sternum.Immediately under
the hyo-thyroideus.To pull the thyroid
cartilage down-
wards.

5. Cricothyroideus.

From the anterior
part and side of the
cricoid cartilage.Into the lower part
and inferior horn of
the thyroid carti-
lage.To pull the cricoid
cartilage upwards
and backwards, or
the thyroid for-
wards and down-
wards.— — — situated be-
tween the os hyoi-
des and lower jaw, 1. Diagastricus (B).

1. Diagastricus (B).

From a fossa at the
root of the mastoid
process, and like-
wise from the os
hyoides.Into the lower and
anterior part of the
chin.To draw the lower jaw
downwards.

2. Stylo-hyoideus (C).

From the basis of the
styloid process.Into the side and fore
part of the os hy-
oides near its base.To draw the os hyoi-
des obliquely up-
wards.

4 U 2

3. Mylo-

(z) This, on account of its two origins, is by Albinus described as two distinct muscles, which he names *sterno-mastoideus* and *cleido-mastoideus*.(A) As this muscle does not always arise from the coracoid process, it seems to have been improperly named *coraco-hyoideus* by Douglas and Albinus. Winslow calls it *omo-hyoideus*, on account of its general origin from the scapula.(B) From *δις* and *γαστήρ* (*biventer*), because it has two fleshy bellies with a middle tendon. This tendon passes through the stylo-hyoideus.(C) In some subjects we meet with another muscle, which, from its having nearly the same origin, insertion, and used as this, has been named *stylo-hyoideus alter*.

A N A T O M Y.

Name.	Origin.	Insertion.	Use.	Of the Muscles.
3. Mylo-hyoideus (D).	From the inside of the lower jaw, between the last dens molaris and the chin.	Into the basis of the os hyoides.	To move the os hyoides to either side, forwards or upwards.	
4. (E) Geno-hyoideus.	From the inside of the chin.	Into the base of the os hyoides.	To move the os hyoides forwards or upwards.	
5. Genio-glossus.	From the inside of the chin.	Into the tongue and basis of the os hyoides.	To move the tongue in various directions.	
6. Hyo-glossus (F).	From the horn, basis, and appendix of the os hyoides.	Into the tongue laterally.	To draw the tongue downwards and inwards.	
7. Lingualis.	Laterally from the root of the tongue.	Into the extremity of the tongue.	To shorten the tongue and draw it backwards.	
8. Stylo-glossus.	From the styloid process, and sometimes also from a ligament that extends from thence to the angle of the lower jaw.	Into the side of the tongue from the root to near its tip.	To move the tongue backwards and to one side.	
9. Stylo-pharyngæus.	From the basis of the styloid process.	Into the side of the pharynx and posterior part of the thyroid cartilage.	To raise the thyroid cartilage and pharynx, and likewise to dilate the latter.	
10. Circumflexus-palati.	From near the bony part of the Eustachian tube, and from the spinous process of the os sphenoides.	Into the semilunar edge of the os palati and the velum pendulum palati (G).	To dilate and draw the velum obliquely downwards.	
11. Levator palati.	From the membranous part of the Eustachian tube, and the extremity of the os petrosus.	Into the velum pendulum palati.	To pull the velum backwards.	
MUSCLES situated about the fauces;	1. Palato-pharyngæus.	From the lower and anterior part of the cartilaginous extremity of the Eustachian tube (H); the tendinous expansion of the circumflexus palati; and the velum pendulum palati near the basis and back part of the uvula.	Into the upper and posterior part of the thyroid cartilage.	To raise the pharynx and thyroid cartilage, or to pull the velum and uvula backwards and downwards.
				2. Constrictor

- (D) So named from its arising near the dentes molares (*μυλοι*), and its being inserted into the os hyoides.
- (E) From *γενιον*, *mentum*, "the chin."
- (F) From *κρας*, *cornu*, and *γλωσσα*, *lingua*, "the tongue."
- (G) This muscle in its course forms a round tendon, which, after passing over a kind of hook formed by the inner plate of the pterygoid process of the sphenoid bone, expands into a tendinous membrane.
- (H) The few fibres that arise from the Eustachian tube are described as a distinct muscle by Albinus, under the name of *salpingo-pharyngæus*. They serve to dilate the mouth of the tube.

Of the
Muscles.Of the
Muscles.

Name.	Origin.	Insertion.	Use.
2. Constrictor isthmi faucium.	From near the basis of the tongue laterally.	Into the velum pendulum palati, near the basis and fore part of the uvula.	To raise the tongue and draw the velum towards it (1).
3. Azygos uvulae.	From the end of the future that unites the ossa palati.	Into the extremity of the uvula.	To shorten the uvula, and bring it forwards and upwards.

MUSCLES at the back
part of the pharynx,

1. Constrictor pharyngis superior.	From the cuneiform process of the occipital bone; the pterygoid process of the os sphenoides, and from each jaw near the last dens molaris (κ).	Into the middle of the pharynx.	To move the pharynx upwards and forwards, and to compress its upper part
------------------------------------	---	---------------------------------	--

2. Constrictor pharyngis medius (L).	From the horn and appendix of the os hyoides, and from the ligament that unites it with the thyroid cartilage.	Into the middle of the processus cuneiformis of the occipital bone, about its middle and before the great foramen.	To draw the os hyoides and pharynx upwards, and to compress the latter.
--------------------------------------	--	--	---

3. Constrictor pharyngis inferior (M).	From the cricoid and thyroid cartilages.	Into the middle of the pharynx.	To compress part of the pharynx.
--	--	---------------------------------	----------------------------------

about the
glottis, - - -

1. Crico-arytænoidaeus lateralis.	From the side of the cricoid cartilage.	Into the basis of the arytænoid cartilage laterally.	To open the glottis.
-----------------------------------	---	--	----------------------

2. Crico-arytænoidaeus posticus.	From the cricoid cartilage posteriorly.	Into the basis of the arytænoid cartilage posteriorly.	To open the glottis.
----------------------------------	---	--	----------------------

3. Aytænoidaeus obliquus.	From the basis of one of the arytænoid cartilages.	Near the extremity of the other arytænoid cartilage.	To draw the parts it is connected with towards each other.
---------------------------	--	--	--

4. Aytænoidaeus transversus.	From one of the arytænoid cartilages laterally.	Into the other arytænoid cartilage laterally.	To shut the glottis.
------------------------------	---	---	----------------------

5. Thyreo-arytænoidaeus.	From the posterior and under part of the thyroid cartilage.	Into the arytænoid cartilage.	To draw the arytænoid cartilage forwards.
--------------------------	---	-------------------------------	---

6. Aytæno-epiglottideus.	From the upper part of the arytænoid cartilage laterally.	Into the side of the epiglottis.	To move the epiglottis outwards.
--------------------------	---	----------------------------------	----------------------------------

7. Thyreo-epiglottideus.	From the thyroid cartilage.	Into the side of the epiglottis.	To pull the epiglottis obliquely downwards (N).
--------------------------	-----------------------------	----------------------------------	---

MUSCLES

(1) This muscle, and the palato-pharyngæus, likewise serve to close the passage into the fauces, and to carry the food into the pharynx.

(κ) The three orders of fibres here mentioned, with a few others derived from the tongue, have given occasion to Douglas to describe them as four distinct muscles, under the names of *cephalo-pharyngæus*, *mylo-pharyngæus*, *ptery-pharyngæus*, and *glosso-pharyngæus*.

(L) Douglas makes two muscles of this, the *hyo-pharyngæus* and *syndesmo-pharyngæus*.

(M) The crico-pharyngæus and thyro-pharyngæus of Douglas.

(N) When either this or the preceding muscle acts with its fellow, the epiglottis is drawn directly downwards upon the glottis.

Of the
Muscles.Muscles at the fore
part of the neck,
close to the verte-
bræ, - - -

Name.

Origin.

Insertion.

Use.

Of the
Muscles.1. Rectus capitis in-
ternus major.From the anterior ex-
tremities of the
transverse processes
of the five lower-
most cervical ver-
tebræ.Into the fore part of
the cuneiform pro-
cess of the os occi-
pitis.To bend the head
forwards.2. Rectus capitis in-
ternus minor.From the anterior
and upper part of
the first cervical
vertebræ.Near the basis of the
condyloid process
of the os occipitis.To assist the last de-
scribed muscle.3. Rectus capitis la-
teralis.From the anterior
and upper part of
the transverse pro-
cess of the first cer-
vical vertebra.Into the os occipi-
tis, opposite to the
stylo-mastoid fora-
men.To move the head to
one side.

4. Longus colli.

Within the thorax,
laterally from the
bodies of the three
uppermost dorsal
vertebræ; from the
basis and fore part
of the transverse
processes of the first
and second dorsal
vertebræ, and of
the last cervical ver-
tebra; and lastly,
from the anterior
extremities of the
transverse processes
of the 6th, 5th, 4th,
and 3d cervical ver-
tebræ.Into the second cer-
vical vertebra an-
teriorly.To pull the neck to
one side (o).----- at the fore
part of the abdo-
men, - - -

1. Obliquus externus.

From the lower edges
of the eight infe-
rior ribs, near their
cartilages.Into the linea alba (p),
ossa pubis (q), and
spine of the ilium
(r).To compress and sup-
port the viscera, af-
fist in evacuating
the feces and urine,
draw down the ribs,
and bend the trunk
forwards, or ob-
liquely to one side.

2. Obliquus internus.

From the spinous pro-
cess of the three
lowermost lumbar.Into the cartilages of
all the false ribs,
linea alba (s), andTo assist the obliquus
externus.

(o) When both muscles act; the neck is drawn directly forwards.

(p) The linea alba is that tendinous expansion which reaches from the cartilago enfiformis to the os pubis. It is formed by the interlacement of the tendinous fibres of the oblique and transverse muscles, and on this account some anatomists have considered these as three digastric muscles.

(q) A little above the pubis the tendinous fibres of this muscle separate from each other, so as to form an opening called the ring of the obliquus externus, and commonly, though improperly, the ring of the abdominal muscles, there being no such aperture either in the transversalis or obliquus internus. This ring in the male subject affords a passage to the spermatic vessels, and in the female to the round ligament of the uterus.

(r) From the anterior and upper spinous process of the ilium, this muscle is stretched tendinous to the os pubis, and thus forms what is called by some Fallopius's, and by others Poupert's ligament. The blood-vessels pass under it to the thigh.

(s) The tendon formed by the upper part of this muscle in its way to the linea alba is divided into two layers. The posterior layer runs under, and the anterior one over, the rectus muscle.

Name.	Origin.	Insertion.	Use.
	vertebræ, the back part of the os sacrum, the spine of the ilium, and back part of Fallopius's ligament (r).	fore part of the pubis.	
3. Transversalis.	From the cartilages of the seven inferior ribs; the transverse processes of the last dorsal, and four upper lumbar vertebræ; the inner part of Fallopius's ligament and the spine of the ilium.	Into the linea alba and cartilago ensiformis.	To compress the abdominal viscera.
4. Rectus abdominis.	From the upper edge of the pubis and the symphysis pubis.	Into the cartilages of the 5th, 6th, and 7th ribs, and the edge of the cartilago ensiformis (v).	To compress the fore part of the abdomen, and to bend the trunk forwards.
5. Pyramidalis (v).	From the anterior and upper part of the pubis.	Into the linea alba and inner edge of the rectus, commonly about two inches above the pubis.	To assist the lower portion of the rectus.

MUSCLES at the fore
part of the thorax -

1. Pectoralis Major.	From the cartilaginous ends of the 5th and 6th ribs; the sternum, and anterior part of the clavicle.	Into the upper and inner part of the os humeri (w).	To draw the arm forwards, or obliquely forwards.
2. Subclavius.	From the cartilage of the first rib.	Into the under surface of the clavicle.	To move the clavicle forwards and downwards, and to assist in raising the first rib.
3. Pectoralis Minor (x).	From the upper edges of the 3d, 4th, and 5th ribs.	Into the coracoid process of the scapula.	To move the scapula forwards and downwards, or to elevate the ribs.
4. Serratus Magnus.	From the eight superior ribs.	Into the basis of the scapula.	To bring the scapula forwards.

MUSCLES

(r) From this part it detaches some fibres which extend downwards upon the spermatic chord, and form what is described as the cremaster muscle.

(v) The fibres of the rectus are generally divided by three tendinous intersections. The two upper thirds of this muscle passing between the tendinous layers of the obliquus internus, are inclosed as it were in a sheath; but at its lower part we find it immediately contiguous to the peritonæum, the inferior portion of the tendon of the transversalis passing over the rectus, and adhering to the anterior layer of the obliquus internus.

(v) This muscle is sometimes wanting.

(w) The fibres of this muscle pass towards the axilla in a folding manner, and with those of the latissimus dorsi form the arm-pit.

(x) This and some other muscles derive their name of *serratus*, from their arising by a number of tendinous or fleshy digitations, resembling the teeth of a saw (*serra*).

Of the
Muscles.MUSCLES that con-
cur in forming the
thorax,

Name.

Origin.

Insertion.

Use.

Of the
Muscles.

1. Diaphragma (γ)

2. Levatores costa-
rum.From the transverse
processes of the last
cervical, and the
eleven upper dor-
sal vertebræ.Into the upper side of
each rib near its
tuberosity.To move the ribs up-
wards and outwards.3. Intercostales exter-
ni.From the lower edge
of each upper rib.Into the superior edge
of each lower rib.

To elevate the ribs.

4. Intercostales in-
terni (A).

5. Sterno costales (B).

From the cartilago en-
siformis, and lower
and middle part of
the sternum.Into the cartilages of
the 2d, 3d, 4th,
5th, and 6th ribs.To depress the carti-
lages of the ribs.at the back
part of the neck
and trunk,1. Trapezius (C), or
cucullaris.From the middle of
the os occipitis,
and the spinous pro-
cesses of the two
inferior cervical,
and of all the dor-
sal vertebræ (D).Into the posterior
half of the clavicle
part of the acro-
mion, and the spine
of the scapula.

To move the scapula.

2. Rhomboideus (E).

From the spinous pro-
cesses of the three
lowermost cervical,
and of all the dor-
sal vertebræ.Into the basis of the
scapula.To move the scapula
upwards and back-
wards.

3. Latissimus dorsi.

From part of the
spine of the os i-
lium, the spinous
processes of the os
sacrum and lumbar
vertebræ, and of six
or eight of the dor-Into the os humeri,
at the inner edge
of the groove for
lodging the long
head of the biceps
muscle.To draw the os hu-
meri downwards
and backwards, and
to roll it upon its
axis.

N° 18.

(γ) For a description of the diaphragm, see Part IV. Sect. IV.

(A) The origin, insertion, and use of the internal intercostals, are similar to those of the external. The reader, however, will be pleased to observe, that the intercostales externi occupy the spaces between the ribs only from the spine to their cartilages; from thence to the sternum, their being only a thin membrane, which is spread over the intercostales interni; and that the latter, on the contrary, extend only from the sternum to the angles of each rib.

The fibres of the external muscles run obliquely forwards; those of the internal obliquely backwards. This difference in the direction of their fibres induced Galen to suppose that they were intended for different uses; that the external intercostals, for instance, serve to elevate, and the internal ones to depress the ribs. Fallopius seems to have been the first who ventured to dispute the truth of this doctrine, which has since been revived by Boyle, and more lately still by Hamberger, whose theoretical arguments on this subject have been clearly refuted by the experiments of Haller.

(B) These consist of four, and sometimes five distinct muscles on each side. Vesalius, and after him Douglas and Albinus, consider them as forming a single muscle, which, on account of its shape, they name *triangularis*. Verheyen, Winslow, and Haller, more properly describe them as so many separate muscles, which, on account of their origin and insertion, they name *sterno-costales*.(C) So named by Riolanus, from *τραπεζα*, on account of its quadrilateral shape. Columbus and others give it the name of *cucullaris*, from its resemblance to a monk's hood.(D) The tendinous fibres of this muscle, united with those of its fellow in the nape of the neck, from what is called the *ligamentum colli*.(E) This muscle consists of two distinct portions, which are described as separate muscles by Albinus, under the names of *rhomboideus minor* and *rhomboideus major*.

Name.	Origin.	Insertion.	Use.
4. Serratus inferior posticus.	From the spinous processes of the two lowermost dorsal, and of three of the lumbar vertebræ.	Into the lower edges of the three or four lowermost ribs near their cartilages.	To draw the ribs outwards, downwards, and backwards.
5. Levator scapulæ.	From the transverse processes of the four uppermost vertebræ colli.	Into the upper angle of the scapula.	To move the scapula forwards and upwards.
6. Serratus superior posticus.	From the lower part of the ligamentum colli, the spinous process of the lowermost cervical vertebra, and of the two superior dorsal vertebræ.	Into the 2d, 3d, and 4th ribs.	To expand the thorax.
7. Splenius (F).	From the spinous processes of the four or five uppermost vertebræ of the back, and of the lowermost cervical vertebra.	Into the transverse processes of the two first cervical vertebræ, the upper and back part of the mastoid process, and a ridge on the os occipitis.	To move the head backwards.
8. Complexus (G).	From the transverse processes of the four or five uppermost dorsal, and of the six lowermost cervical vertebræ.	Into the os occipitis.	To draw the head backwards.
9. Trachelo-mastoides (H).	From the transverse processes of the first dorsal vertebra, and four or five of the lowermost cervical vertebræ.	Into the mastoid process.	To draw the head backwards.
10. Rectus capitis posterior major.	From the spinous process of the second cervical vertebra.	Into the os occipitis.	To extend the head and draw it backwards.
11. Rectus capitis posterior minor.	From the first vertebra of the neck.	Into the os occipitis.	To assist the rectus major.
12. Obliquus superior capitis.	From the transverse process of the first cervical vertebra.	Into the os occipitis.	To draw the head backwards.
13. Obliquus inferior capitis.	From the spinous process of the second cervical vertebra.	Into the transverse process of the first cervical vertebra.	To draw the face towards the shoulder, and to move the first vertebra upon the second.

(F) According to some writers, this muscle has gotten its name from its resemblance to the spleen; others derive it from *splenium splint*.

(G) So named on account of its complicated structure.

(H) So named from its origin from the neck (*τραχιλος*) and its insertion into the mastoid process.

Name.	Origin.	Insertion.	Use.	Of the Muscles.
14. Sacro-lumbalis (1).	From the back part of the os sacrum, spine of the ilium, spinous processes, and roots of the transverse processes of the vertebræ of the loins.	Into the lower edge of each rib.	To draw the ribs downwards, move the body upon its axis, assist in erect- ing the trunk, and turn the neck back- wards, or to one side.	
15. Longissimus dor- si (κ).	The same as that of the sacro-lumbalis.	Into the transverse processes of the dor- sal vertebræ.	To stretch the verte- bræ of the back, and keep the trunk erect.	
16. Spinalis dorsi.	From the spinous pro- cesses of the upper- most lumbar and lowermost dorsal vertebræ.	Into the spinous pro- cesses of the nine superior dorsal ver- tebræ.	To extend the verte- bræ.	
17. Semi-spinalis dor- si.	From the transverse processes of the 7th, 8th, 9th, and 10th vertebræ of the back.	Into the spinous pro- cesses of the four uppermost dorsal, and lowermost of the cervical verte- bræ.	To extend the spine obliquely back- wards.	
18. Multifidus Spi- næ (λ).	From the os sacrum, ilium, oblique and transverse processes of the lumbar ver- tebræ, transverse processes of the dor- sal, and four of the cervical vertebræ.	Into the spinous pro- cesses of the lum- bar, dorsal, and six of the cervical ver- tebræ.	To extend the back and draw it back- wards, or to one side.	
19. Semi-spinalis col- li.	From the transverse processes of the five or six uppermost dorsal vertebræ.	Into the spinous pro- cesses of the 2d, 3d, 4th, 5th, and 6th cervical verte- bræ.	To stretch the neck obliquely backwards.	
20. Scalenus (μ).	From the transverse processes of the five inferior cervical ver- tebræ.	Into the upper and outer part of the first and second ribs.	To move the neck forwards, or to one side.	

21. Inter-

(1) Several thin fasciculi of fleshy fibres arise from the lower ribs, and terminate in the inner side of this muscle. Steno names them *musculi ad sacro lumbalem accessorii*. The sacro-lumbalis likewise sends off a fleshy slip from its upper part, which by Douglas and Albinus is described as a distinct muscle, under the name of *cervicalis descendens*. Morgagni has very properly considered it as a part of the sacro-lumbalis.

(κ) At the upper part of this muscle a broad thin layer of fleshy fibres is found crossing, and intimately adhering to it. This portion, which is described by Albinus, under the name of *transversalis cervicis*, may very properly be considered as an appendage to the longissimus dorsi. It arises from the transverse processes of the five or six superior dorsal vertebræ, and is inserted into the transverse processes of the six inferior cervical vertebræ. By means of this appendage the longissimus dorsi may serve to move the neck to one side, or obliquely backwards.

(λ) Anatomists in general have unnecessarily multiplied the muscles of the spine. Albinus has the merit of having introduced greater simplicity into this part of myology. Under the name of *multifides spinæ*, he has very properly included those portions of muscular flesh intermixed with tendinous fibres, situated close to the back part of the spine, and which are described by Douglas under the names of *transversales colli, dorsi, & lumborum*.

(μ) The ancients gave it this name from its resemblance to an irregular triangle (σκαληνος). It consists of three fleshy portions. The anterior one affords a passage to the axillary artery, and between this and the middle portion we find the nerves going to the upper extremities. The middle is in part covered by the posterior portion, which is the longest and thinnest of the three.

Of the
Muscles.Of the
Muscles.

Name.	Origin.	Insertion.	Use.
21. Inter-spinales (N).	From the upper part of each of the spinous processes of the six inferior cervical vertebræ.	Into the under part of each of the spinous processes of the vertebræ above.	To draw the spinous processes towards each other.
22. Inter-transversales (O).	From the upper part of each of the transverse processes of the vertebræ.	Into the under part of each of the transverse processes of the vertebræ above.	To draw the transverse processes towards each other.

MUSCLES within the cavity of the abdomen, on the anterior and lateral parts of the spine,

1. Psoas parvus (P).	From the sides and transverse processes of the uppermost lumbar vertebra, and sometimes of the lowermost dorsal vertebra.	Into the brim of the pelvis, at the junction of the os pubis with the ilium.	To bend the loins forwards.
2. Psoas magnus.	From the bodies and transverse processes of the last dorsal, and all the lumbar vertebræ.	Into the os femoris, a little below the trochanter minor.	To bend the thigh forwards.
3. Iliacus internus.	From the inner lip, hollow part, and edge of the os ilium.	In common with the psoas magnus.	To assist the psoas magnus.
4. Quadratus lumborum (Q).	From the posterior part of the spine of the ilium.	Into the transverse processes of the four uppermost lumbar vertebræ, the inferior edge of the last rib, and the side of the lowermost dorsal vertebra.	To support the spine, or to draw it to one side.
5. Coccygæus.	From the posterior and inner edge of the spine of the ischium.	Into the lower part of the os sacrum, and almost the whole length of the os coccygis laterally.	To draw the os coccygis forwards and inwards (R).

— on the scapula and upper part of the os humeri,

1. Deltoides (S).	From the clavicle, processus acromion, and spine of the scapula.	Into the anterior and middle part of the os humeri.	To raise the arm.
2. Supra-spinatus.	From the basis, spine, and upper costa of the scapula.	Into a large tuberosity at the head of the os humeri.	To raise the arm.

4 X 2

3. Infra-

(N) In the generality of anatomical books we find these muscles divided into *inter spinales cervicis, dorfi, and lumborum*, but we do not find any such muscles either in the loins or back.

(O) These muscles are to be found only in the neck and loins; what have been described as the *inter-transversales dorfi* being rather small tendons than muscles.

(P) This and the following pair of muscles derive their name of *psoas* from $\psi\omicron\alpha$, *lumbus*, on account of their situation at the anterior part of the loins.

(Q) So called from its shape, which is that of an irregular square.

(R) Some of the fibres of this muscle are united with those of the levator ani, so that it assists in closing the lower part of the pelvis.

(S) So named from its supposed resemblance to the Greek Δ reversed.

A N A T O M Y.

Part II.

Name.	Origin.	Insertion.	Use.	Part of Muscles.
3. Infra-spinatus.	From the basis and spine of the scapula.	Into the upper and middle part of the tuberosity.	To roll the os humeri outwards.	Part of Muscles.
4. Teres minor (r).	From the inferior costa of the scapula.	Into the lower part of the tuberosity.	To assist the infra spinatus.	
5. Teres major.	From the inferior angle, and inferior costa of the scapula.	Into the ridge at the inner side of the groove formed for the long head of the biceps.	To assist in the rotatory motion of the arm.	
6. Subscapularis.	From the basis, superior and inferior costæ of the scapula.	Into the upper part of a small tuberosity at the head of the os humeri.	To roll the arm inwards.	
7. Coraco-brachialis (v).	From the coracoid process of the scapula.	Into the middle and inner side of the os humeri.	To roll the arm forwards and upwards.	
MUSCLES on the os humeri, - - -				
1. Biceps flexor cubiti.	By two heads, one from the coracoid process, and the other, or long head, from the upper and outer edge of the glenoid cavity of the scapula.	Into the tuberosity at the upper end of the radius.	To bend the fore-arm.	
2. Brachialis internus.	From the os humeri, below, and at each side of the tendon of the deltoides.	Into a small tuberosity at the fore part of the coronoid process of the ulna.	To assist in bending the fore-arm.	
3. Triceps extensor cubiti.	By three heads: the first, from the inferior costa of the scapula; the second, from the upper and outer part of the os humeri; and the third, from the back part of that bone.	Into the upper and outer part of the olecranon.	To extend the fore-arm.	
----- on the fore-arm, - - -				
1. Supinator longus.	From the outer ridge and anterior surface of the os humeri, a little above its outer condyle.	Into the radius near its styloid process.	To assist in turning the palm of the hand upwards.	5. Extensor
2. Extensor carpi radialis longus.	Immediately below the origin of the supinator longus.	Into the upper part of the metacarpal bone of the fore-finger.	To extend the wrist.	
3. Extensor carpi radialis brevis.	From the outer and lower part of the outer condyle of the os humeri, and the upper part of the radius.	Into the upper part of the metacarpal bone of the middle finger.	To assist the extensor longus.	
4. Extensor digitorum communis.	From the outer condyle of the os humeri.	Into the back part of all the bones of the four fingers.	To extend the fingers.	
5. Extensor				

(r) This and the following pair are called *teres*, from their being of a long and round shape.
 (v) This muscle affords a passage to the musculo-cutaneous nerve.

Name.	Origin.	Insertion.	Use.	Of the Muscles.
5. Extensor minimi digiti.	From the outer condyle of the os humeri.	Into the bones of the little finger.	To extend the little finger.	
6. Extensor carpi ulnaris.	From the outer condyle of the os humeri.	Into the metacarpal bone of the little finger.	To assist in extending the wrist.	
7. Anconæus (v).	From the outer condyle of the os humeri.	Into the outer edge of the ulna.	To extend the fore arm.	
8. Flexor carpi ulnaris.	From the inner condyle of the os humeri, and anterior edge of the olecranon (w).	Into the os pisiforme.	To assist in bending the hand.	
9. Palmaris longus.	From the inner condyle of the os humeri.	Into the internal annular ligament, and aponeurosis palmaris (x).	To bend the hand.	
10. Flexor carpi radialis.	From the inner condyle of the os humeri.	Into the metacarpal bone of the fore finger.	To bend the hand.	
11. Pronator radii teres.	From the outer condyle of the os humeri, and coronoid process of the ulna.	Into the anterior and convex edge of the radius, near its middle.	To roll the hand inwards.	
12. Flexor sublimis perforatus (v).	From the inner condyle of the os humeri, inner edge of the coronoid process of the ulna, and upper and anterior part of the radius.	Into the second bone of each finger.	To bend the second joint of the fingers.	
13. Supinator radii brevis.	From the outer condyle of the os humeri, and posterior surface and outer edge of the ulna.	Into the anterior, inner, and upper part of the radius.	To roll the radius outwards.	
14. Abductor pollicis longus.	From the middle and back part of the ulna, interosseous ligament, and radius.	By two tendons into the os trapezium, and first bone of the thumb.	To stretch the first bone of the thumb outwards.	
15. Extensor minor pollicis.	From the back part of the ulna, and interosseous ligament and radius.	Into the convex part of the second bone of the thumb.	To extend the second bone of the thumb obliquely outwards.	
16. Extensor major pollicis.	From the back of the ulna and interosseous ligament.	Into the third and last bone of the thumb.	To stretch the thumb obliquely backwards.	
17. Indicator.	From the middle of the ulna.	Into the metacarpal bone of the fore-finger.	To extend the fore-finger.	

18 Flexor

(v) So called from *αλκων, cubitus*.

(w) Between the two origins of this muscle we find the ulnar-nerve going to the fore arm.

(x) The aponeurosis palmaris is a tendinous membrane that extends over the palm of the hand. Some anatomists have supposed it to be a production of the tendon of this muscle, but without sufficient grounds; for in some subjects we find the palmaris longus inserted wholly into the annular ligament, so as to be perfectly distinct from this aponeurosis; and it now and then happens, that no palmaris longus is to be found, whereas this expansion is never deficient.

(v) This muscle is named *perforatus*, on account of the four tendons in which it terminates, being perforated by those of another muscle, the perforans.

Name.	Origin.	Insertion.	Use.	Of the Muscles.
18. Flexor profundus perforans.	From the upper and fore part of the ulna, and interosseous ligament.	Into the fore part of the last bone of each of the fingers.	To bend the last joint of the fingers.	
19. Flexor longus pollicis.	From the upper and fore part of the radius.	Into the last joint of the thumb.	To bend the last joint of the thumb.	
20. Pronator radii quadratus.	From the inner and lower part of the ulna.	Into the radius, opposite to its origin.	To roll the radius inwards, and of course to assist in the pronation of the hand.	
MUSCLES on the hand				
1. Lumbricales (z).	From the tendons of the perforans.	Into the tendons of the extensor digitorum communis.	To bend the first, and to extend the two last joints of the fingers. (A).	
2. Abductor brevis pollicis.	From the fore part of the internal annular ligament, os scaphoides, and one of the tendons of the abductor longus pollicis.	Into the outer side of the 2d bone of the thumb, near its root.	To move the thumb from the fingers.	
3. Opponens pollicis.	From the inner and anterior part of the internal annular ligament, and from the os scaphoides.	Into the first bone of the thumb.	To move the thumb inwards, and to turn it upon its axis.	
4. Flexor brevis pollicis.	From the os trapezoides, internal annular ligament, os magnum, and os unciforme.	Into the ossa sesamoides and second bone of the thumb.	To bend the second joint of the thumb.	
5. Abductor pollicis.	From the metacarpal bone of the middle finger.	Into the basis of the second bone of the thumb.	To move the thumb towards the fingers.	
6. Abductor indicis.	From the inner side of the first bone of the thumb, and from the os trapezium.	Into the first bone of the fore finger posteriorly.	To move the fore finger towards the thumb.	
7. Palmaris brevis.	From the internal annular ligament, and aponeurosis palmaris.	Into the os pisiforme, and the skin covering the abductor minimi digiti.	To contract the palm of the hand.	
8. Abductor minimi digiti.	From the internal annular ligament and os pisiforme.	Into the side of the first bone of the little finger.	To draw the little finger from the rest.	
9. Flexor parvus minimi digiti.	From the os unciforme and internal annular ligament.	Into the first bone of the little finger.	To bend the little finger.	
10. Abductor metacarpi minimi digiti.	From the os unciforme and internal annular ligament.	Into the metacarpal bone of the little finger.	To move that bone towards the rest.	
11. Interossei interni.	Situated between the metacarpal bones.	Into the roots of the fingers.	To extend the fingers and move them towards the thumb (B).	Interossei

(z) So named from their being shaped somewhat like the lumbricus or earth-worm.

(A) Fallopius was the first who remarked the two opposite uses of this muscle. Their extending power is owing to their connection with the extensor communis.

(B) The third interosseus internus (for there are four of the externi and three of the interni) differs from the rest in drawing the middle finger from the thumb.

Of the
Muscles.Name.
Interossei externi.Origin.
Situating between the
metacarpal bones
on the back of the
hand.Insertion.
Into the roots of the
fingers.Use.
To extend the fin-
gers; but the first
draws the middle
finger inwards, the
second draws it out-
wards, and the third
draws the ring fin-
ger inwards.Of the
Muscles.MUSCLES at the back
part of the pelvis,
and upper part of
the thigh, - -1. Glutæus (c) max-
imus.From the spine of the
ilium, posterior sa-
cro-ischiatic liga-
ments, os sacrum,
and os coccygis.Into the upper part
of the *linea aspera*
of the os femoris.To extend the thigh
and draw it out-
wards.

2. Glutæus medius.

From the spine and
superior surface of
the ilium.Into the outer and
back part of the
great trochanter of
the os femoris.To draw the thigh
outwards and a
little backwards,
and when it is
bended, to roll it.

3. Glutæus minimus.

From the outer sur-
face of the ilium,
and the border of
its great niche.Into the upper and
anterior part of the
great trochanter.

To assist the former.

4. Pyriformis (d).

From the anterior
part of the os sa-
crum.Into a cavity at the
root of the tro-
chanter major.To roll the thigh out-
wards.

5. Gemini (e).

By two portions, one
from the outer sur-
face of the spine of
the ischium; the
other from the tu-
berosity of the is-
chium and posteri-
or sacro-ischiatic li-
gament.Into the same cavity
as the pyriformis.To roll the thigh out-
wards, and likewise
to confine the ten-
don of the obtura-
tor internus, when
the latter is in ac-
tion.6. Obturator inter-
nus.From the superior
half of the inner
border of the fo-
ramen thyroideum.Into the same cavity
with the former.To roll the thigh out-
wards.7. Quadratus (f) fe-
moris.From the tuberosity
of the ischium.Into a ridge between
the trochanter ma-
jor and trochanter
minor.To move the thigh
outwards.— on the thigh
(c), - - -1. Biceps flexor cru-
ris.By two heads; one
from the tuberosity
of the ischium.Into the upper and
back part of the fi-
bula (h).

To bend the leg.

(c) From γαντος, nates.

(e) The two portions of this muscle having been described as two distinct muscles by some anatomists, have occasioned it to be named *gemini*. The tendon of the obturator internus runs between these two por-
tions.(f) This muscle is not of the square shape its name would seem to indicate.
(g) The muscles of the leg and thigh are covered by a broad tendinous membrane called *fascia lata*, that surrounds them in the manner of a sheath. It is sent off from the tendons of the glutæi and other muscles, and dipping down between the muscles it covers, adheres to the *linea aspera*, and spreading over the joint of the knee, gradually disappears on the leg. It is thickest on the inside of the thigh.(h) The tendon of this muscle forms the *outer ham-string*.

(d) So named from its pear-like shape.

- the other from the
linea aspera near
the insertion of the
glutæus maximus.
2. Semi-tendinosus. From the tuberosity of the ischium. Into the upper and inner part of the tibia. To bend and draw the leg inwards.
3. Semi-membranosus (1). From the tuberosity of the ischium. Into the upper and back part of the head of the tibia. To bend the leg.
4. Tensor vaginæ femoris. From the superior and anterior spinous process of the ilium. Into the inner side of the fascia lata, which covers the outside of the thigh. To stretch the fascia.
5. Sartorius. From the superior and anterior spinous process of the ilium. Into the upper and inner part of the tibia. To bend the leg inwards (κ).
6. Rectus. By two tendons; one from the anterior and inferior spinous process of the ilium; the other from the posterior edge of the cotyloid cavity. Into the upper and fore-part of the patella. To extend the leg.
7. Gracilis. From the fore-part of the ischium and pubis. Into the upper and inner part of the tibia. To bend the leg.
8. Vastus externus (L). From the anterior and lower part of the great trochanter, and the outer edge of the linea aspera. To the upper and outer part of the patella. To extend the leg.
9. Vastus internus. From the inner edge of the linea aspera, beginning between the fore-part of the os femoris and the root of the lesser trochanter. Into the upper and inner part of the patella. To extend the leg.
10. Cruræus (M). From the outer and anterior part of the lesser trochanter. Into the upper part of the patella. To extend the leg.
11. Pectinalis. From the anterior edge of the os pubis, or pectinis, as it is sometimes called. Into the upper fore-part of the linea aspera. To draw the thigh inwards, upwards, and to roll it a little outwards.

N° 18.

12. Adductor

(1) So named on account of its origin, which is by a broad flat tendon three inches long.

(κ) Spigelius was the first who gave this the name of *sartorius*, or the taylor's muscle, from its use in crossing the legs.(L) The vastus externus, vastus internus, and cruræus, are so intimately connected with each other, that some anatomists have been induced to consider them as a *triceps*, or single muscle with three heads.(M) Under the cruræus we sometimes meet with two small muscles, to which Albinus has given the name of *sub-cruræi*. They terminate on each side of the patella, and prevent the capsular ligament from being pinched. When they are wanting, which is very often the case, some of the fibres of the cruræus are found adhering to the capsula.

Of the
Muscles.Of the
Muscles.

	Name.	Origin.	Insertion.	Use.
	12. Adductor longus femoris (N).	From the upper and fore part of the os pubis.	Near the middle and back part of the linea aspera.	To draw the thigh inwards, upwards, and to roll it a little outwards.
	13. Adductor brevis femoris.	From the fore part of the ramus of the os pubis.	Into the inner and upper part of the linea aspera.	
	14. Adductor magnus femoris.	From the lower and fore part of the ramus of the os pubis.	Into the whole length of the linea aspera.	
	15. Obturator externus.	From part of the obturator ligament, and the inner half of the circumference of the foramen thyroideum.	Into the os femoris, near the root of the great trochanter.	To move the thigh outwards in an oblique direction, and likewise to bend and draw it inwards.
MUSCLES on the leg,	1. Gastrocnemius (O) externus.	By two heads; one from the inner condyle, the other from the outer condyle of the os femoris.	By a great round tendon, common to this and the following muscle.	To extend the foot.
	2. Gastrocnemius (P) internus.	By two heads; one from the back part of the head of the fibula, the other from the upper and back part of the tibia.	By a large tendon (the <i>tendo achillis</i>) common to this and the former muscle, into the lower and back part of the os calcis.	To extend the foot.
	3. Plantaris (Q).	From the upper and posterior part of the outer condyle of the os femoris.	Into the inside of the back part of the os calcis.	To assist in extending the foot.
	4. Popliteus (R).	From the outer condyle of the thigh.	Into the upper and inner part of the tibia.	To assist in bending the leg and rolling it inwards.
	5. Flexor longus digitorum pedis (S).	From the upper and inner part of the tibia.	By four tendons, which, after passing through the perforations in those of the flexor digitorum brevis, are inserted into the last bone of all the toes, except the great toe.	To bend the last joint of the toe.
	6. Flexor longus pollicis pedis.	From the back part, and a little below the head of the fibula.	Into the last bone of the great toe.	To bend the great toe.

Vol. I. Part II.

4 Y

7. Tibialis

(N) This and the two following muscles have been usually, but improperly, considered as forming a single muscle with three heads, and on that account named *triceps femoris*.

(O) Γαστροκνημία, *sura*, "the calf of the leg."

(P) This muscle is by some anatomists named *soleus*, on account of its being shaped like the sole-fish.

(Q) This muscle has gotten the name of *plantaris*, from its being supposed to furnish the aponeurosis that covers the sole of the foot; but it does not in the least contribute to the formation of that tendinous expansion.

(R) So called on account of its situation at the ham (*poples*).

(S) This muscle, about the middle of the foot, unites with a fleshy mass, which, from its having first been described by Sylvius, is usually called *massa carnea JACOBI SYLVII*.

Of the
Muscles.

Name.	Origin.	Insertion.	Use.	Of the Muscles.
7. Tibialis posticus.	From the back part and outer edge of the tibia, and likewise from the interosseous ligament and adjacent part of the fibula.	Into the inner and upper part of the os naviculare and side of the os cuneiforme medium.	To move the foot inwards.	
8. Peroneus longus.	From the outer side of the head of the tibia, and also from the upper, anterior, and outer part of the <i>perone</i> or fibula, to which it adheres for a considerable way down.	Into the metatarsal bone of the great toe.	To move the foot outwards.	
9. Peroneus brevis.	From the outer and fore part of the fibula.	Into the metatarsal bone of the little toe.	To assist the last described muscle.	
10. Extensor longus digitorum pedis.	From the upper, outer, and fore part of the tibia, interosseous ligament, and inner edge of the fibula.	By four tendons into the first joint of the smaller toes.	To extend the toes.	
11. Peroneus tertius.	From the fore part of the lower half of the fibula, and from the interosseous ligament.	Into the metatarsal bone of the little toe.	To bend the foot.	
12. Tibialis anticus.	From the upper and fore part of the tibia.	Into the os cuneiforme internum.	To bend the foot.	
13. Extensor proprius pollicis pedis.	From the upper and fore part of the tibia.	Into the convex surface of the bones of the great toe.	To extend the great toe.	
MUSCLES on the foot, 1. Extensor brevis digitorum pedis.	From the upper and anterior part of the os calcis.	By four tendons; one of which joins the tendon of the extensor longus pollicis, and the other three the tendons of the extensor digitorum longus.	To extend the toes.	
2. Flexor brevis digitorum pedis.	From the lower part of the os calcis.	By four tendons, which, after affording a passage to those of the flexor longus, are inserted into the second phalanx of each of the small toes.	To bend the second joint of the toes.	
3. Abductor pollicis pedis.	From the inner and lower part of the os calcis.	Into the first joint of the great toe.	To move the great toe from the other toes.	
4. Abductor minimi digiti.	From the outer tubercle of the os calcis, the root of the metatarsal bone of the little toe, and also from the aponeurosis plantaris.	Into the outer side of the first joint of the little toe.	To draw the little toe outwards.	

<i>Name.</i>	<i>Origin.</i>	<i>Insertion.</i>	<i>Use.</i>	<i>Of the Muscles.</i>
5. Lumbricales pedis.	From the tendons of the flexor longus digitorum pedis.	Into the tendinous expansion at the upper part of the toes.	To draw the toes inwards.	A detailed anatomical drawing of a right foot from a dorsal perspective. Various muscles are labeled with numbers corresponding to the table. A bracket on the far right groups muscles 1 through 6 under the heading 'Of the Muscles.'.
6. Flexor brevis pollicis pedis.	From the inferior and anterior part of the os calcis, and also from the inferior part of the os cuneiforme externum.	By two tendons into the first joint of the great toe.	To bend the first joint of the great toe.	
7. Adductor pollicis pedis.	From near the roots of the metatarsal bones of the 2d, 3d, and 4th toes.	Into the outer os sesamoideum, or first joint of the great toe.	To draw the great toe nearer to the rest, and also to bend it.	
8. Transversales pedis.	From the outer and under part of the anterior end of the metatarsal bone of the little toe.	Into the inner os sesamoideum, and anterior end of the metatarsal bone of the great toe.	To contract the foot.	
9. Flexor brevis minimi digiti pedis.	From the basis of the metatarsal bone of the little toe.	Into the first joint of the little toe.	To bend the little toe.	
10. Interossei pedis interni (r). externi (v).	Situated between the metatarsal bones.			

EXPLANATION OF PLATES XXI. and XXII.

PLATE XXI.

FIG. I. The **MUSCLES** immediately under the common teguments on the anterior part of the body are represented on the right side; and on the left side the **MUSCLES** are seen which come in view when the exterior ones are taken away.

A, The frontal muscle. B, The tendinous aponeurosis which joins it to the occipital; hence both named *occipito-frontalis*. C, Attolens aurem. D, The ear. E, Anterior auris. FF, Orbicularis palpebrarum. G, Levator labii superioris alæque nasi. H, Levator anguli oris. I, Zygomaticus minor. K, Zygomaticus major. L, Masseter. M, Orbicularis oris. N, Depressor labii inferioris. O, Depressor anguli oris. P, Buccinator. QQ, Platysma myoides. RR, Sternocleido-mastoidæus. S, Part of the trapezius. T, Part of the scaleni.

SUPERIOR EXTREMITY.—U, Deltoides. V, Pectoralis major. W, Part of the latissimus dorsi. X X, Biceps flexor cubiti. Y Y, Part of the brachialis externus. Z Z, The beginning of the tendinous aponeurosis (from the biceps), which is spread over the muscles of the fore-arm. a a, Its strong tendon inserted into the tubercle of the radius. b b, Part of the brachialis internus. c, Pronator radii teres. d, Flexor carpi radialis. e, Part of the flexor carpi ulnaris. f, Palmaris longus. g, Aponeurosis palmaris. 3, Palmaris brevis. i, Ligamentum carpi annulare. 2 2, Abductor minimi digiti. h, Supinator radii longus.

i, The tendons of the thumb. k, Abductor pollicis.
l, Flexor pollicis longus. m m, The tendons of the
flexor sublimis perforatus, profundus perforans, and
lumbricales.—The sheaths are entire in the right hand,
—in the left cut open, to show the tendons of the flexor
profundus perforating the sublimis.

MUSCLES not referred to—in the left superior extremity.—n, Pectoralis minor, seu serratus anticus minor. o, The two heads of (xx) the biceps. p, Coracobrachialis. qq, The long head of the triceps extensor cubiti. rr, Teres major. ff, Subscapularis. tt, Extensores radiales. u, Supinator brevis. v, The cut extremity of the pronator teres. w, Flexor sublimis perforatus. x, Part of the flexor profundus. y, Flexor pollicis longus. z, Part of the flexor pollicis brevis. 4, Abductor minimi digiti. 5, The four lumbricales.

TRUNK.—6, Serrated extremities of the ferratus anticus major. 77, Obliquus externus abdominis. 88, The linea alba. 9, The umbilicus. 10, Pyramidalis. 1111, The spermatic cord. On the left side it is covered by the cremaster. 1212, Rectus abdominis. 13, Obliquus internus. 1414, &c. Intercostal muscles.

INFERIOR EXTREMITIES.—*aa*, The gracilis. *bb*, Parts of the triceps. *cc*, Pectialis. *dd*, Psoas magnus. *ee*, Iliacus internus. *f*, Part of the glutæus medius. *g*, Part of the glutæus minimus. *h*, Cut extremity of the rectus cruris. *ii*, Vastus externus, *k*, Tendon of the rectus cruris. *ll*, Vastus internus.

4 Y 2. * Sartorius

(v) The interossei externi are four in number; the first serves to move the fore-toe towards the great toe; the rest move the toes outwards. All the interossei assist in extending the toes.

Of the
Muscles.

* Sartorius muscle. ** Flethy origin of the tensor vaginæ femoris or membranofus. Its tendinous aponeurosis covers (*i*) the vastus externus in the right side. *mm*, Patella. *nn*, Ligament or tendon from it to the tibia. *o*, Rectus cruris. *p*, Cruræus. *qq*, The tibia. *rr*, Part of the gemellus or gastrocnemius externus. *sss*, Part of the soleus or gastrocnemius internus. *t*, Tibialis anticus. *u*, Tibialis posticus. *vv*, Peronæi muscles. *ww*, Extensor longus digitorum pedis. *xx*, Extensor longus pollicis pedis. *y*, Abductor pollicis pedis.

FIG. 2. The MUSCLES, GLANDS, &c. of the Left Side of the Face and Neck, after the common Teguments and Platysma myoides have been taken off.

a, The frontal muscle. *b*, Temporalis and temporal artery. *c*, Orbicularis palpebrarum. *d*, Levator labii superioris alæqui nasi. *e*, Levator anguli oris. *f*, Zygomaticus. *g*, Depressor labii inferioris. *h*, Depressor anguli oris. *i*, Buccinator. *k*, Masseter. *ll*, Parotid gland. *m*, Its duct. *n*, Sterno-cleido-mastoidæus. *o*, Part of the trapezius. *p*, Sterno-hyoidæus. *q*, Sterno-thyroidæus. *r*, Omo-hyoidæus. *s*, Levator scapulæ. *tt*, Scaleni. *u*, Part of the splenius.

FIG. 3. The MUSCLES of the Face and Neck in view after the exterior ones are taken away.

aa, Corrugator supercilii. *b*, Temporalis. *c*, Tendon of the levator palpebræ superioris. *d*, Tendon of the orbicularis palpebrarum. *e*, Masseter. *f*, Buccinator. *g*, Levator anguli oris. *h*, Depressor labii superioris alæque nasi. *i*, Orbicularis oris. *k*, Depressor anguli oris. *l*, Muscles of the os hyoides. *m*, Sterno-cleido-mastoidæus.

FIG. 4. Some of the MUSCLES of the Os Hyoides and Submaxillary Gland.

a, Part of the masseter muscle. *b*, Posterior head of the digastric. *c*, Its anterior head. *dd*, Sterno-hyoidæus. *e*, Omo-hyoidæus. *f*, Stylo-hyoidæus. *g*, Submaxillary gland in situ.

FIG. 5. The Submaxillary Gland and Duct.

a, Musculus mylo-hyoidæus. *b*, Hyo-glossus. *c*, Submaxillary gland extra situ. *d*, Its duct.

PLATE XXII.

FIG. 1. The MUSCLES immediately under the common teguments on the posterior part of the body are represented in the right side; and on the left side the MUSCLES are seen which come in view when the exterior ones are taken away.

HEAD.—*AA*, Occipito-frontalis. *B*, Attollens aurem. *C*, Part of the orbicularis palpebrarum. *D*, Masseter. *E*, Pterygoidæus internus.

TRUNK.—Right side. *FFF*, Trapezius seu cucullaris. *GGGG*, Latissimus dorsi. *H*, part of the obliquus externus abdominis.

TRUNK.—Left side. *I*, Splenius. *K*, Part of the complexus. *L*, Levator scapulæ. *M*, Rhomboides. *NN*, Serratus posticus inferior. *O*, Part of the longissimus dorsi. *P*, Part of the sacro-lumbalis. *Q*, Part of the semi-spinalis dorsi. *R*, Part of the serratus an-

ticus major. *S*, Part of the obliquus internus abdominis.

SUPERIOR EXTREMITY.—Right side. *T*, Deltoides. *U*, Triceps extensor cubiti. *V*, Supinator longus. *WW*, Extensores carpi radialis longior and brevior. *XX*, Extensor carpi ulnaris. *YY*, Extensor digitorum communis. *Z*, Abductor indicis. *1 2 3*, Extensores pollicis.

SUPERIOR EXTREMITY.—Left side. *a*, Supra spinatus. *b*, Infra-spinatus. *c*, Teres minor. *d*, Teres major. *e*, Triceps extensor cubiti. *ff*, Extensores carpi radiales. *g*, Supinator brevis. *h*, Indicator. *1 2 3*, Extensores pollicis. *i*, Abductor minimi digiti. *k*, Interossei.

INFERIOR EXTREMITY.—Right side. *l*, Glutæus maximus. *m*, Part of the glutæus medius. *n*, Tensor vaginæ femoris. *o*, Gracilis. *pp*, Adductor femoris magnus. *q*, Part of the vastus internus. *r*, Semimembranosus. *s*, Semitendinosus. *t*, Long head of the biceps flexor cruris. *uu*, Gastrocnemius externus seu gemellus. *v*, Tendo Achillis. *w*, Soleus seu gastrocnemius internus. *xx*, Peronæus longus and brevis. *y*, Tendons of the flexor longus digitorum pedis;—and under them * flexor brevis digitorum pedis. *z*, Abductor minimi digiti pedis.

INFERIOR EXTREMITY.—Left side. *m, n, o, pp, q, r, s, t, v, ww, xx, y, z*, Point the same parts as in the right side. *a*, Pyriformis. *bb*, Gemini. *cc*, Obturator internus. *d*, Quadratus femoris. *e*, Coccygæus. *f*, The short head of the biceps flexor cruris. *gg*, Plantaris. *h*, Poplitæus. *i*, Flexor longus pollicis pedis.

FIG. 2. The Palm of the Left Hand after the common Teguments are removed, to show the MUSCLES of the Fingers.

a, Tendon of the flexor carpi radialis. *b*, Tendon of the flexor carpi ulnaris. *c*, Tendons of the flexor sublimis perforatus, profundus perforans and lumbricales. *d*, Abductor pollicis. *ee*, Flexor pollicis longus. *f*, Flexor pollicis brevis. *g*, Palmaris brevis. *h*, Abductor minimi digiti. *i*, Ligamentum carpi annulare. *k*, A probe put under the tendons of the flexor digitorum sublimis; which are perforated by *l*, the flexor digitorum profundus. *mmmm*, Lumbricales. *n*, Adductor pollicis.

FIG. 3. A Fore-view of the Foot and Tendons of the Flexores Digitorum.

a, Cut extremity of the tendo achillis. *b*, Upper part of the astragalus. *c*, Os calcis. *d*, Tendon of the tibialis anticus. *e*, Tendon of the extensor pollicis longus. *f*, Tendon of the peronæus brevis. *g*, Tendons of the flexor digitorum longus, with the nonus Vesalii. *hh*, The whole of the flexor digitorum brevis.

FIG. 4. MUSCLES of the Anus.

aa, An outline of the buttocks, and upper part of the thighs. *b*, The testes contained in the scrotum. *cc*, Sphincter ani. *d*, Anus. *e*, Levator ani. *ff*, Erector penis. *gg*, Accelerator urinæ. *h*, Corpus cavernosum urethræ.

FIG. 5. MUSCLES of the Penis.

aa, b, d, ee, ff, h, point the same as in fig. 4. *c*, Sphincter ani. *g, g*, Transversalis penis.

Fig. 1.

Fig. 2.

Fig. 3.



Fig. 4.



Fig. 5.



ANATOMY.

Fig. 2.



Fig. 1.

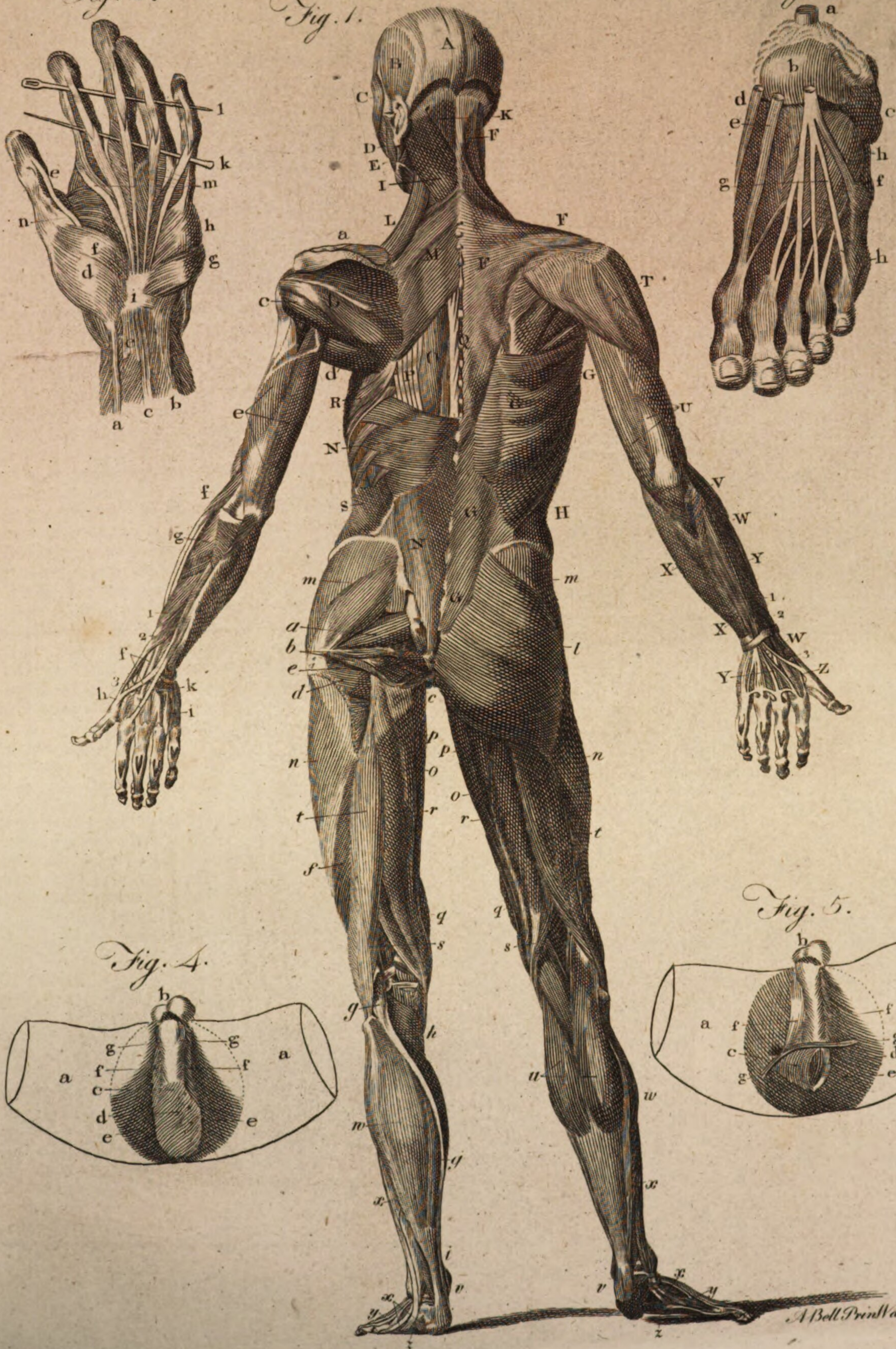


Fig. 3.



Fig. 4.

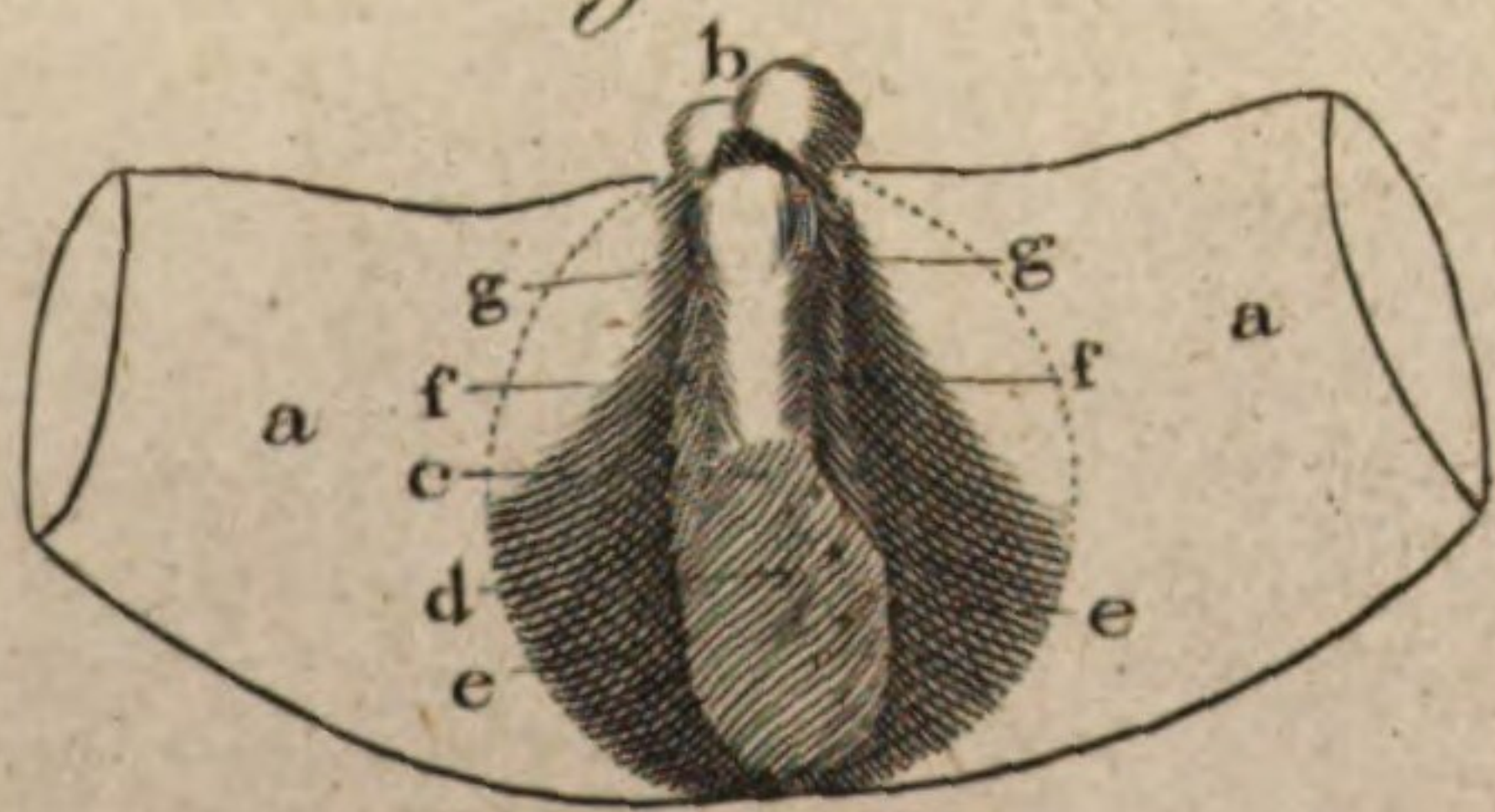
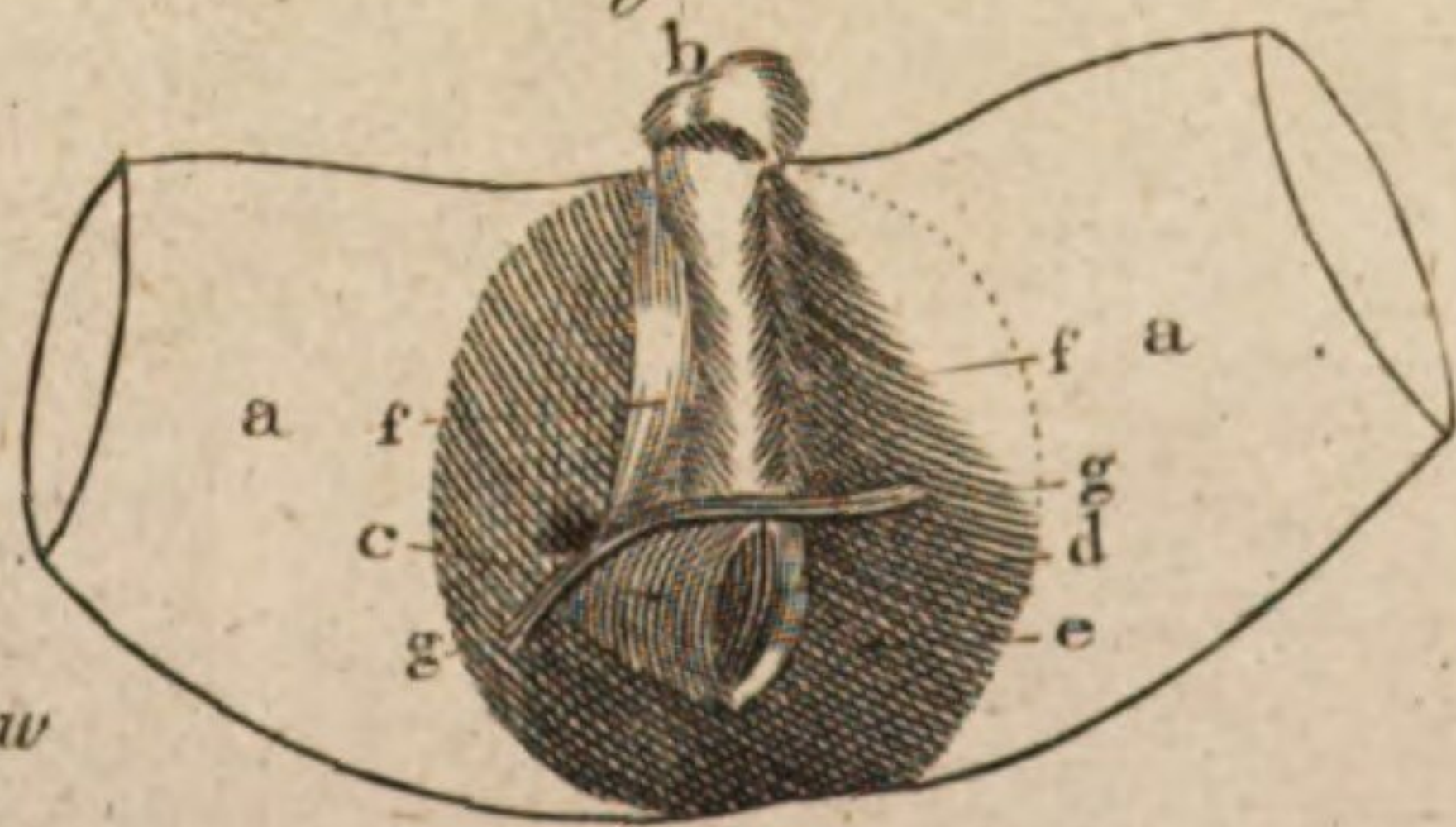


Fig. 5.



A Bell PrinWale Sculptor fecit

PART III. OF THE ABDOMEN, OR LOWER BELLY.

38

THE abdomen, or lower belly, extends from the lower extremity of the sternum, or the hollow, usually called the pit of the stomach, and more properly *scrobiculus cordis*, to the lower part of the trunk.

It is distinguished into three divisions called *regions*; of these the upper one, which is called the *epigastric region*, begins immediately under the sternum, and extends to within two fingers breadth of the navel, where the middle or *umbilical region* begins, and reaches to the same distance below the navel. The third, which is called the *hypogastric*, includes the rest of the abdomen, as far as the os pubis.

Each of these regions is subdivided into three others; two of which compose the sides, and the other the middle part of each region.

The middle part of the upper region is called *epigastrium*, and its two sides *hypochondria*. The middle part of the next region is the umbilical region, properly so called, and its two sides are the flanks, or iliac regions. Lastly, the middle part of the lower region retains the name of hypogastrium, and its sides are called inguina or groins. The back part of the abdomen bears the name of lumbar region.

These are the divisions of the lower belly, which are necessary to be held in remembrance, as they frequently occur in surgical and anatomical writing. We will now proceed to examine the contents of the abdomen; and after having pointed out the names and arrangement of the several viscera contained in it, describe each of them separately.

After having removed the skin, adipose membrane, and abdominal muscles, we discover the peritonæum or membrane that envelopes all the viscera of the lower belly. This being opened, the first part that presents itself is the omentum or cawl, floating on the surface of the intestines, which are likewise seen every where loose and moist, and making a great number of circumvolutions through the whole cavity of the abdomen. The stomach is placed in the epigastrium, and under the stomach is the pancreas. The liver fills the right hypochondrium, and the spleen is situated in the left. The kidneys are seen about the middle of the lumbar region, and the urinary bladder and parts of generation are seated in the lower division of the belly.

SECT. I. Of the Peritonæum.

89

THE peritonæum is a strong simple membrane, by which all the viscera of the abdomen are surrounded, and in some measure supported. Many anatomical writers, particularly Winslow, have described it as being composed of two distinct membranous laminae; but their description seems to be erroneous. What perhaps appeared to be a second lamina, being found to be simply a cellular coat, which sends off productions to the blood-vessels passing out of the abdominal cavity. The aorta and vena cava likewise derive a

covering from the same membrane, which seems to be a part of the cellular membrane we have already described.

The peritonæum, by its productions and reduplications, envelopes the greatest part of the abdominal viscera. It is soft, and capable of considerable extension; and is kept smooth and moist by a vapour, which is constantly exhaling from its inner surface, and is returned again into the circulation by the absorbents.

This moisture not only contributes to the softness of the peritonæum, but prevents the attrition, and other ill effects which would otherwise probably be occasioned, by the motion of the viscera upon each other.

When this fluid is supplied in too great a quantity, or the absorbents become incapable of carrying it off, it accumulates, and constitutes an ascitis or dropsy of the belly; and when by any means the exhalation is discontinued, the peritonæum thickens, becomes diseased, and the viscera are sometimes found adhering to each other.

The peritonæum is not a very vascular membrane. In a sound state it seems to be endued with little or no feeling, and the nerves that pass through it appear to belong to the abdominal muscles.

SECT. II. Of the Omentum.

90

THE omentum, epiploon, or cawl, is a double membrane, produced from the peritonæum. It is interlarded with fat, and adheres to the stomach, spleen, duodenum, and colon; from thence hanging down loose and floating on the surface of the intestines. Its size is different in different subjects. In some it descends as low as the pelvis, and it is commonly longer at the left side than the right.

This part, the situation of which we have just now described, was the only one known to the ancients under the name of *epiploon*; but at present we distinguish three omenta, viz. *omentum magnum colico gastricum*, *omentum parvum hepatico gastricum*, and *omentum colicum*. They all agree in being formed of two very delicate laminae, separated by a thin layer of cellular membrane.

The omentum magnum colico gastricum, of which we have already spoken, derives its arteries from the splenic and hepatic. Its veins terminate in the vena portæ. Its nerves, which are very few, come from the splenic and hepatic plexus.

The omentum parvum hepatico gastricum, abounds less with fat than the great epiploon. It begins at the upper part of the duodenum, extends along the lesser curvature of the stomach as far as the œsophagus, and terminates about the neck of the gall-bladder, and behind the left ligament of the liver, so that it covers the lesser lobe; near the beginning of which we may observe a small opening, first described by Winslow, through which the whole pouch may easily be distended

Of the
Abdomen.

ed with air (x). The vessels of the omentum parvum are derived chiefly from the coronary stomachic arteries and veins.

The omentum colicum begins at the fore part of the cæcum and right side of the colon. It appears as a hollow conical appendage to these intestines, and usually terminates at the back of the omentum magnum. It seems to be nothing more than a membranous coat of the cæcum and colon, assuming a conical shape when distended with air.

The uses of the omentum are not yet satisfactorily determined. Perhaps by its softness and looseness it may serve to prevent those adhesions of the abdominal viscera, which have been found to take place when the fat of the omentum has been much wasted. Some authors have supposed, that it assists in the preparation of bile; but this idea is founded merely on conjecture.

SECT. III. Of the Stomach.

91. THE stomach is a membranous and muscular bag, in shape not unlike a bagpipe, lying across the upper part of the abdomen, and inclining rather more to the left than the right side.

It has two orifices, one of which receives the end of the œsophagus, and is called the *cardia*, and sometimes the left and upper orifice of the stomach; though its situation is not much higher than the other, which is styled the right and inferior orifice, and more commonly the *pylorus*; both these openings are more elevated than the body of the stomach.

The aliment passes down the œsophagus into the stomach through the cardia, and after having undergone the necessary digestion, passes out at the pylorus where the intestinal canal commences.

The stomach is composed of four tunics or coats, which are so intimately connected together that it requires no little dexterity in the anatomist to demonstrate them. The exterior one is membranous, being derived from the peritonæum.—The second is a muscular tunic, composed of fleshy fibres which are in the greatest number about the two orifices.—The third is called the nervous coat, and within this is the villous or velvet-like coat which composes the inside of the stomach.

The two last coats being more extensive than the two first, form the folds, which are observed every where in the cavity of this viscus, and more particularly about the pylorus; where they seem to impede the too hasty exclusion of the aliment, making a considerable plait, called *valvula pylori*.

The inner coat is constantly moistened by a mucus, which approaches to the nature of the saliva, and is called the gastric juice; this liquor has been supposed to be secreted by certain minute glands (v) seated in the nervous tunic, whose excretory ducts open on the surface of the villous coat.

Of the
Abdomen.

The arteries of the stomach called the gastric arteries are principally derived from the celiac; some of its veins pass to the splenic, and others to the vena portæ; and its nerves are chiefly from the eighth pair or par vagum.

The account given of the tunics of the stomach may be applied to the whole alimentary canal; for both the œsophagus and intestines are, like this viscus, composed of four coats.

Before we describe the course of the aliment and the uses of the stomach, it will be necessary to speak of other parts which assist in the process of digestion.

SECT. IV. Of the Oesophagus.

92. THE œsophagus or gullet is a membranous and muscular canal, extending from the bottom of the mouth to the upper orifice of the stomach—Its upper part where the aliment is received is shaped somewhat like a funnel, and is called the *pharynx*.

From hence it runs down close to the bodies of the vertebræ as far as the diaphragm, in which there is an opening through which it passes, and then terminates in the stomach about the eleventh or twelfth vertebra of the back.

The œsophagus is plentifully supplied with arteries from the external carotid, bronchial, and superior intercostal arteries; its veins empty themselves into the vena azygos, internal jugular, and mammary veins, &c.

Its nerves are derived chiefly from the eighth pair.

We likewise meet with a mucus in the œsophagus, which every where lubricates its inner surface, and tends to assist in deglutition.—This mucus seems to be secreted by very minute glands, like the mucus in other parts of the alimentary canal.

SECT. V. Of the Intestines.

93. THE intestines form a canal, which is usually six times longer than the body to which it belongs. This canal extends from the pylorus, or inferior orifice of the stomach, to the anus.

It will be easily understood, that a part of such great length must necessarily make many circumvolutions, to be confined with so many other viscera within the cavity of the lower belly.

Although the intestines are in fact, as we have observed, only one long and extensive canal, yet different parts have been distinguished by different names.

The intestines are first distinguished into two parts, one of which begins at the stomach, and is called the *thin* or *small intestines*, from the small size of the canal, when compared with the other part, which is called the *large intestines*, and includes the lower portion of the canal down to the anus.

Each of these parts has its subdivisions.—The small in-

(x) This membranous bag, though exceedingly thin and transparent, is found capable of supporting mercury, thrown into it by the same channel.

(v) Heister, speaking of these glands, very properly says, “in porcis facile, in homine raro observantur;” for although many anatomical writers have described their appearance and figure, yet they do not seem to have been hitherto satisfactorily demonstrated in the human stomach; and the gastric juice is now more generally believed to be derived from the exhalant arteries of the stomach.

Of the
Abdomen.

intestines being distinguished into duodenum, jejunum, and ileum, and the larger portion into cæcum, colon, and rectum.

The small intestines fill the middle and fore parts of the belly, while the large intestines fill the sides and both the upper and lower parts of the cavity.

The duodenum, which is the first of the small intestines, is so called, because it is about 12 inches long. It begins at the pylorus and terminates in the jejunum, which is a part of the canal observed to be usually more empty than the other intestines.—This appearance gives it its name, and likewise serves to point out where it begins.

The next division is the ileum, which of itself exceeds the united length of the duodenum and jejunum, and has received its name from its numerous circumvolutions. The large circumvolution of the ileum covers the first of the large intestines called the *cæcum* (x), which seems properly to belong to the colon, being a kind of pouch of about four fingers in width, and nearly of the same length, having exteriorly a little appendix, called *appendix cæci*.

The cæcum is placed in the cavity of the os ilium on the right side, and terminates in the colon, which is the largest of all the intestines.

This intestine ascends by the right kidney to which it is attached, passes under the hollow part of the liver, and the bottom of the stomach to the spleen, to which it is likewise secured, as it is also to the left kidney; and from thence passes down towards the os sacrum, where, from its straight course, the canal begins to take the name of *rectum*.

There are three ligamentous bands extending thro' the whole length of the colon, which by being shorter than its two inner coats, serve to increase the plaits on the inner surface of this gut.

The *anus*, which terminates the *intestinum rectum*, is furnished with three muscles; one of these is composed of circular fibres, and from its use in shutting the passage of the anus is called *sphincter ani*.

The other two are the *levator ani*, so called, because they elevate the anus after defection. When these by palsy, or any other disease, lose the power of contracting, the anus prolapses; and when the sphincter is affected by similar causes, the fæces are voided involuntarily.

It has been already observed, that the intestinal canal is composed of four tunics; but it remains to be remarked, that here, as in the stomach, the two inner tunics being more extensive than the other two, from the plaits which are to be seen in the inner surface of the intestines, and are called *valvula conniventes*.

Of the
Abdomen.

Some authors have considered these plaits as tending to retard the motion of the fæces, in order to afford more time for the separation of the chyle; but there are others who attribute to them a different use: they contend, that these valves, by being naturally inclined downwards, cannot impede the descent of the fæces, but that they are intended to prevent their return upwards.

They are probably destined for both these uses; for although these folds incline to their lower side, yet the inequalities they occasion in the canal are sufficient to retard in some measure the progressive motion of the fæces, and to afford a greater surface for the absorption of chyle, and their natural position seems to oppose itself to the return of the aliment.

Besides these *valvula conniventes*, there is one more considerable than the rest, called the *valve of the colon*; which is found at that part of the canal where the *intestinum ileum* is joined to the colon. This valve permits the alimentary pulp to pass downwards, but serves to prevent its return upwards; and it is by this valve, that glysters are prevented from passing into the small intestines (y).

Of the little vermiform appendix of the cæcum, it will be sufficient to say, that its uses have never yet been ascertained. In birds we meet with two of these appendices.

The intestines are lubricated by a constant supply of mucus, which is probably secreted by very minute follicles (z). This mucus promotes the descent of the alimentary pulp, and in some measure defends the inner surface of the intestines from the irritation to which it would, perhaps, otherwise be continually exposed from the aliment; and which, when in a certain degree, excites a painful disorder called *colic*, a name given to the disease, because its most usual seat is in the *intestinum colon*.

The intestines are likewise frequently distended with air, and this distension sometimes occasions pain, and constitutes the flatulent colic.

The arteries of the intestines are continuations of the mesenteric arteries, which are derived in two considerable branches from the aorta.—The redundant blood is carried back into the *vena portarum*.

In the rectum the veins are called *hemorrhoidal*, and are there distinguished into internal and external: the first are branches of the inferior mesenteric vein, but the latter pass into other veins. Sometimes these veins are distended with blood from obstructions, from weakness of their coats, or from other causes, and what we call the *hemorrhoids* takes place. In this disease they are sometimes ruptured; and the discharge of blood which

(x) Anatomists have differed with respect to this division of the intestines.—The method here followed is now generally adopted; but there are authors who allow the name of *cæcum* only to the little appendix, which has likewise been called the *vermiform appendix*, from its resemblance to a worm in size and length.

(y) This is not invariably the case, for the contents of a glyster have been found not only to reach the small intestines, but to be voided at the mouth. Such instances, however, are not common.

(z) Some writers have distinguished these glands into miliary, lenticular, &c.—Brunner and Peyer were the first anatomists who described the glands of the intestines, and their descriptions were chiefly taken from animals, these glandular appearances not seeming to have been hitherto satisfactorily pointed out in the human subject.—It is now pretty generally believed, that the mucus which everywhere lubricates the alimentary canal, is exhaled from the minute ends of arteries; and that these extremities first open into a hollow vesicle, from whence the deposited juice of several branches flows out through one common orifice.

Of the which consequently follows, has probably occasioned them to be called *hæmorrhoidal veins*.

The nerves of the intestines are derived from the eighth pair.

SECT. VI. *Of the Mesentery.*

94. THE name of the *mesentery* implies its situation amidst the intestines. It is in fact a part of the peritonæum, being a reduplication (A) of that membrane from each side of the lumbar vertebræ, to which it is firmly attached, so that it is formed of two laminæ, connected to each other by cellular membrane.

The intestines, in their different circulations, form a great number of arches, and the mesentery accompanies them through all these turns; but by being attached only to the hollow part of each arch, it is found to have only a third of the extent of the intestines.

That part of this membrane which accompanies the small intestines is the *mesentery*, properly so called; but those parts of it which are attached to the colon and rectum are distinguished by the names of *meso-colon* and *meso-rectum*.

There are many conglobate glands dispersed through this double membrane, through which the lacteals and lymphatics pass in their way to the thoracic duct. The blood-vessels of the mesentery were described in speaking of the intestines.

This membrane, by its attachment to the vertebræ, serves to keep the intestines in their natural situation. The idea usually formed of the colic called *miserere*, is perfectly erroneous; it being impossible that the intestines can be twisted, as many suppose they are, in that disease, their attachment to the mesentery effectually preventing such an accident—but a disarrangement sometimes takes place in the intestinal canal itself, which is productive of disagreeable and sometimes fatal consequences.—This is by an intussusception of the intestine, an idea of which may be easily formed, by taking the finger of a glove, and involving one part of it within the other.

If inflammation takes place, the stricture in this case is increased, and the peristaltic motion of the intestines (by which is meant the progressive motion of the fæces downwards) is inverted, and what is called the *iliac passion* takes place. The same effects may be occasioned by a descent of the intestine, or of the omentum either with it or by itself, and thus constituting what is called an *hernia* or *rupture*; a term by which in general is meant the falling down or protrusion of any part of the intestine, or omentum, which ought naturally to be contained within the cavity of the belly.

Nº 19.

To convey an idea of the manner in which such a descent takes place, it will be necessary to observe, that the lower edge of the tendon of the musculus obliquus externus, is stretched from the fore part of the os ilium or haunch-bone of the os pubis, and constitutes what is called *Poupart's* or *Fallopian's ligament*, forming an opening, through which pass the great crural artery and vein. Near the os pubis the same tendinous fibres are separated from each other, and form an opening on each side, called the *abdominal ring*, through which the spermatic vessels pass in men, and the ligamenta uteri in women. In consequence of violent efforts, or perhaps of natural causes, the intestines are found sometimes to pass through these openings; but the peritonæum which incloses them when in their natural cavity, still continues to surround them even in their descent. This membrane does not become torn or lacerated by the violence, as might be easily imagined; but its dilatibility enables it to pass out with the viscus, which it incloses as it were in a bag, and thus forms what is called the *hernial sac*.

If the hernia be under Poupart's ligament, it is called *femoral*; if in the groin, *inguinal* (B); and *scrotal*, if in the scrotum. Different names are likewise given to the hernia as the contents of the sac differ, whether of omentum only or intestine, or both:—but these definitions more properly belong to the province of surgery.

SECT. VII. *Of the Pancreas.*

95. THE pancreas is a conglomerate gland, placed behind the bottom of the stomach, towards the first vertebra of the loins; shaped like a dog's tongue, with its point stretched out towards the spleen, and its other end extending towards the duodenum. It is about eight fingers breadth in length, two or three in width, and one in thickness.

This viscus, which is of a yellowish colour, somewhat inclined to red, is covered with a membrane which it derives from the peritonæum. Its arteries, which are rather numerous than large, are derived chiefly from the splenic and hepatic, and its veins pass into the veins of the same name.—Its nerves are derived from the intercostal.

The many little glands of which it has been observed the pancreas is composed, all serve to secrete a liquor called the *pancreatic juice*, which in its colour, consistence, and other properties, does not seem to differ from the saliva. Each of these glands sends out a little excretory duct, which uniting with others, help to form larger ducts; and all these at last terminate in one common excretory duct (first discovered by Virsungus in

(A) He who only reads of the reduplication of membranes, will perhaps not easily understand how the peritonæum and pleura are reflected over the viscera in their several cavities; for one of these serves the same purposes in the thorax that the other does in the abdomen. This disposition, for the discovery of which we are indebted to modern anatomists, constitutes a curious part of anatomical knowledge: but the student, unaided by experience, and assisted only by what the limits of this work would permit us to say on the occasion, would probably imbibe only confused ideas of the matter; and it will perfectly answer the present purpose, if he considers the mesentery as a membrane attached by one of its sides to the lumbar vertebræ, and by the other to the intestines.

(B) The hernia congenita will be considered with the male organs of generation, with which it is intimately connected.

Of the Abdomen. in 1642), which runs through the middle of the gland, and is now usually called *ductus pancreaticus Virtsungi*. This canal opens into the intestinum duodenum, sometimes by the same orifice with the biliary duct, and sometimes by a distinct opening. The liquor it discharges being of a mild and insipid nature, serves to dilute the alimentary pulp, and to incorporate it more easily with the bile.

SECT. VIII. *Of the Liver.*

96

THE liver is a viscus of considerable size, and of a reddish colour; convex superiorly and anteriorly where it is placed under the ribs and diaphragm, and of an unequal surface posteriorly. It is chiefly situated in the right hypochondrium, and under the false ribs; but it likewise extends into the epigastric region, where it borders upon the stomach. It is covered by a production of the peritoneum, which serves to attach it by three of its reduplications to the false ribs. These reduplications are called *ligaments*, though very different in their texture from what are called by the same name in other parts of the body. The umbilical cord, too, which in the foetus is pervious, gradually becomes a simple ligament after birth; and by passing to the liver, serves likewise to secure it in its situation.

At the posterior part of this organ where the umbilical vessels enter, it is found divided into two lobes. Of these, the largest is placed in the right hypochondrium; the other, which covers part of the stomach, is called the *little lobe*. All the vessels which go to the liver pass in at the fissure we have mentioned; and the production of the peritoneum, which invests the liver, was described by Glisson, an English anatomist, as accompanying them in their passage, and surrounding them like a glove; hence this production has been commonly known by the name of *capsula of Glisson*: but it appears to be chiefly a continuation of the cellular membrane which covers the vena porta ventralis.

The liver was considered by the ancients as an organ destined to prepare and perfect the blood; but later discoveries have proved, that this opinion was wrong, and that the liver is a glandular substance formed for the secretion of the bile.

The blood is conveyed to the liver by the hepatic artery and the vena portæ. This is contrary to the mode of circulation in other parts, where veins only serve to carry off the redundant blood: but in this viscus the hepatic artery, which is derived from the celiac, is principally destined for its nourishment; and the vena porta, which is formed by the union of the veins from most of the abdominal viscera, furnishes the blood from which the bile is chiefly to be separated: so that these two series of vessels serve very distinct purposes. The vena porta, as it is ramified through the liver, performs the office both of a vein and an artery; for like the former it returns the blood from the extremities of arteries, while as the latter it prepares it for secretion.

The nerves of the liver are branches of the intercostal and par vagum. The bile, after being separated

Vol. I. Part II.

from the mass of blood, in a manner of which mention will be made in another place, is conveyed out of this organ by very minute excretory ducts, called *pori biliarii*; these uniting together like the excretory ducts in the pancreas, gradually form larger ones, which at length terminate in a considerable channel called *ductus hepaticus*.

SECT. IX. *Of the Gall-bladder.*

THE gall-bladder is a little membranous bag, shaped like a pear, and attached to the posterior and almost inferior part of the great lobe of the liver.

It has two tunics; of which the exterior one is a production of the peritoneum. The interior, or villous coat, is supplied with a mucus that defends it from the acrimony of the bile. These two coverings are intimately connected by means of cellular membrane, which from its firm glistening appearance has generally been spoken of as a muscular tunic.

The gall-bladder is supplied with blood-vessels from the hepatic arteries. These branches are called the *cystic arteries*, and the cystic veins carry back the blood.

Its nerves are derived from the same origin as those of the liver.

The neck of the gall-bladder is continued in the form of a canal called *ductus cysticus*, which soon unites with the ductus hepaticus we described as the excretory duct of the liver; and forming one common canal, takes the name of *ductus coledochus communis*, through which both the cystic and hepatic bile are discharged into the duodenum. This canal opens into the intestine in an oblique direction, first passing through the exterior tunic, and then piercing the other coats after running between each of them a very little way. This œconomy serves two useful purposes;—to promote the discharge of bile and to prevent its return.

The bile may be defined to be a natural liquid soap, somewhat unctuous and bitter, and of a yellowish colour, which easily mixes with water, oil, and vinous spirits, and is capable of dissolving resinous substances. From some late experiments made by M. Cadet *, it appears to be formed of an animal oil, combined with the alkaline base of sea-salt, a salt of the nature of milk, and a calcareous earth which is slightly ferruginous. 1767.

Its definition seems sufficiently to point out the uses for which it is intended (c). It blends the alimentary mass, by dividing and attenuating it; corrects the too great disposition to acescency, which the aliment acquires in the stomach; and, finally, by its acrimony, tends to excite the peristaltic motion of the intestines.

After what has been said, it will be conceived that there are two sorts of bile; one of which is derived immediately from the liver through the hepatic duct, and the other from the gall-bladder. These two biles, however, do not essentially differ from each other. The hepatic bile indeed is milder, and more liquid than the cystic, which is constantly thicker and yellower;

4 Z

and

(c) The ancients, who were not acquainted with the real use of the liver, considered the bile as an excrementitious and useless fluid.

Of the
Abdomen.

and by being bitterer, seems to possess greater activity than the other.

Every body knows the source of the hepatic bile, that it is secreted from the mass of blood by the liver; but the origin of the cystic bile has occasioned no little controversy amongst anatomical writers. There are some who contend, that it is separated in the substance of the liver, from whence it passes into the gall-bladder through particular vessels. In deer, and in some other quadrupeds, as well as in several birds and fishes, there is an evident communication, by means of particular vessels, between the liver and the gall-bladder. Bianchi, Winslow, and others, have asserted the existence of such vessels in the human subject, and named them *hepatocystic ducts*; but it is certain that no such ducts exist.—In obstructions of the cystic duct, the gall-bladder has been found shrivelled and empty: so that we may consider the gall-bladder as a reservoir of hepatic bile; and that it is an established fact, that the whole of the bile contained in the gall-bladder is derived from the liver; that it passes from the hepatic to the cystic duct, and from that to the gall-bladder. The difference in the colour, consistence, and taste of the bile, is merely the consequence of stagnation and absorption. When the stomach is distended with aliment, this reservoir undergoes a certain degree of compression, and the bile passes out into the intestinal canal; and in the efforts to vomit, the gall-bladder seems to be constantly affected, and at such times discharges itself of its contents.

Sometimes the bile concretes in the gall-bladder so as to form what are called *gall-stones* (D). When these concretions pass into the cystic duct, they sometimes occasion exquisite pain, by distending the canal in their way to the duodenum; and by lodging in the ductus choledochus communis, and obstructing the course of the bile, this fluid will be absorbed, and by being carried back into the circulation occasion a temporary jaundice.

SECT. X. Of the Spleen.

99 THE spleen is a soft and spongy viscus, of a bluish colour, and about five or six fingers breadth in length, and three in width, situated in the left hypochondrium, between the stomach and the false ribs. That side of it which is placed on the side of the ribs is convex; and the other, which is turned towards the stomach, is concave.

The splenic artery, which is a branch from the celiac, supplies this viscus with blood, and a vein of the same name carries it back into the venæ porta.

Its nerves are derived from a particular plexus called the *splenic*, which is formed by branches of the intercostal nerve, and by the eighth pair, or par vagum.

The ancients, who supposed two sorts of bile, considered the spleen as the receptacle of what they called *atra*

bilis. Havers, who wrote professedly on the bones, Of the determined its use to be that of secreting the synovia; Abdomen. and the late Mr Hewson imagined, that it concurred with the thymus and lymphatic glands of the body in forming the red globules of the blood. All these opinions seem to be equally fanciful. The want of an excretory duct has occasioned the real use of this viscus to be still doubtful. Perhaps the blood undergoes some change in it, which may assist in the preparation of the bile. This is the opinion of the generality of modern physiologists; and the great quantity of blood with which it is supplied, together with the course of its veins into the vena portæ, seem to render this notion probable.

SECT. XI. Of the Glandulæ Renales, Kidneys, and Ureters.

THE glandulæ renales, which were by the ancients supposed to secrete the atra bilis, and by them named *capsulæ atrabiles*, are two flat bodies of an irregular figure, one on each side between the kidney and the aorta. 100

In the fœtus they are as large as the kidneys: but they do not increase afterwards in proportion to those parts; and in adults and old people they are generally found shrivelled, and much wasted. They have their arteries and veins. Their arteries usually arise from the splenic or the emulgent, and sometimes from the aorta; and their veins go to the neighbouring veins, or to the vena cava. Their nerves are branches of the intercostal.

The use of these parts is not yet perfectly known. In the fœtus the secretion of urine must be in a very small quantity, and a part of the blood may perhaps then pass through these channels, which in the adult is carried to the kidneys to supply the matter of urine.

The kidneys are two in number, situated one on the right and the other on the left side in the lumbar region, between the last false rib and the os ilium, by the sides of the vertebræ. Each kidney in its figure resembles a sort of bean, which from its shape is called *kidney-bean*. The concave part of each kidney is turned towards the aorta and vena cava ascendens. They are surrounded by a good deal of fat, and receive a coat from the peritonæum; and when this is removed, a very fine membrane is found investing their substance and the vessels which ramify through them. 101 Kidneys.

Each kidney has a considerable artery and vein, which are called the *emulgent*. The artery is a branch from the aorta, and the vein passes into the vena cava. Their nerves, which every where accompany the blood-vessels, arise from a considerable plexus, which is derived from the intercostal.

In each kidney, which in the adult is of a pretty firm texture, there are three substances to be distinguished (E). The outer part is glandular or cortical, beyond

(D) These concretions sometimes remain in the gall-bladder without causing any uneasiness. Dr Heberden relates, that a gall-stone weighing two drams was found in the gall-bladder of the late Lord Bath, though he had never complained of the jaundice, nor of any disorder which he could attribute to that cause. *Med. Transf.* Vol. ii.

(E) The kidneys in the fœtus are distinctly lobulated; but in the adult they become perfectly firm, smooth, and regular.

Of the Abdomen. beyond this is the vascular or tubular substance, and the inner part is papillary or membranous.

It is in the cortical part of the kidney that the secretion is carried on; the urine being here received from the minute extremities of the capillary arteries, is conveyed out of this cortical substance by an infinite number of very small cylindrical canals or excretory vessels, which constitute the tubular part. These tubes, as they approach the inner substance of the kidney, gradually unite together; and thus forming larger canals, at length terminate in ten or twelve little protuberances called *papillæ*, the orifices of which may be seen without the assistance of glasses. These *papillæ* open into a small cavity or reservoir called the *pelvis of the kidney*, and formed by a distinct membranous bag which embraces the *papillæ*. From this *pelvis* the urine is conveyed through a membranous canal which passes out from the hollow side of the kidney, a little below the blood-vessels, and is called *ureter*.

101
Ureters.

The ureters are each about as large as a common writing-pen. They are somewhat curved in their course from the kidneys, like the letter *f*, and at length terminate in the posterior and almost inferior part of the bladder, at some distance from each other. They pass into the bladder in the same manner as the ductus choledochus communis passes into the intestinum duodenum, not by a direct passage, but by an oblique course between the two coats; so that the discharge of urine into the bladder is promoted, whilst its return is prevented. Nor does this mode of structure prevent the passage of fluids only from the bladder into the ureters, but likewise air:—for air thrown into the bladder inflates it, and it continues to be distended if a ligature is passed round its neck; which seems to prove sufficiently that it cannot pass into the ureters.

SECT. XII. *Of the Urinary Bladder.*

102

THE urinary bladder is a membranous and muscular bag of an oblong roundish shape, situated in the pelvis, between the os pubis and intestinum rectum in men, and between the os pubis and uterus in women. Its upper and widest part is usually called the *bottom*, its narrower part the *neck* of the bladder; the former only is covered by the peritonæum.

The bladder is formed of three coats, connected together by means of cellular membrane. The external or peritonæal, is only a partial one, covering the upper and back part of the bladder. The middle, or muscular coat, is composed of irritable, and of course muscular fibres, which are most collected around the neck of the bladder, but not so as to form a distinct muscle, or sphincter, as the generality of anatomists have hitherto supposed.

The inner coat, though much smoother, has been said to resemble the villous tunic of the intestines, and like that is provided with a mucus, which defends it against the acrimony of the urine.

103
Of the urine.

It will be easily conceived from what has been said, that the kidneys are two glandular bodies, thro' which a saline and excrementitious fluid called *urine* is constantly filtering from the mass of blood.

While only a small quantity of urine is collected in the bladder, it excites no kind of uneasiness; but when a greater quantity is accumulated, so that the bladder

is distended in a certain degree, it excites in us a certain sensation, which brings on as it were a voluntary contraction of the bladder to promote its discharge.—But this contraction is not affected by the muscular fibres of the bladder alone: for all the abdominal muscles contract in obedience to our will, and press downwards all the viscera of the lower belly; and these powers being united, at length overcome the resistance of the fibres surrounding the neck of the bladder, which dilates and affords a passage to the urine through the urethra.

The frequency of this evacuation depends on the quantity of urine secreted; on the degree of acrimony it possesses; on the size of the bladder, and on its degree of sensibility.

The urine varies much in its colour and contents. These varieties depend on age, sex, climate, diet, and other circumstances. In infants it is generally a clear watery fluid, without smell or taste. As we advance in life, it acquires more colour and smell, and becomes more impregnated with salts. In old people it becomes still more acrid and fetid.

In a healthy state it is nearly of a straw colour.—After being kept for some time, it deposits a tartarous matter, which is found to be composed chiefly of earth and salt, and soon incrusts the sides of the vessel in which it is contained. While this separation is taking place, appearances like minute fibres or threads of a whitish colour, may be seen in the middle of the urine, and an oily scum observed floating on its surface. So that the most common appearances of the urine are sufficient to ascertain that it is a watery substance, impregnated with earthy, saline, and oily particles.

The urine is not always voided of the same colour and consistence; for these are found to depend on the proportion of its watery part to that of its other constituent principles.—Its colour and degree of fluidity seem to depend on the quantity of saline and inflammable particles contained in it: so that an increased proportion of those parts will constantly give the urine a higher colour, and add to the quantity of sediment.

The variety in the appearance of the urine, depends on the nature and quantity of solid and fluid aliment we take in; and it is likewise occasioned by the different state of the urinary vessels, by which we mean the channels through which it is separated from the blood, and conveyed through the pelvis into the ureters. The causes of calculous concretions in the urinary passages, are to be looked for in the natural constitution of the body, mode of life, &c.

It having been observed, that after drinking any light wine or spa water, it very soon passed off by urine, it has been supposed by some, that the urine is not altogether conveyed to the bladder by the ordinary course of circulation, but that there must certainly exist some other shorter means of communication, perhaps by certain vessels between the stomach and the bladder, or by a retrograde motion in the lymphatics. But it is certain, that if we open the belly of a dog, press out the urine from the bladder, pass a ligature round the emulgent arteries, and then sew up the abdomen, and give him even the most diuretic liquor to drink, the stomach and other channels will be distend-

Of the
Abdomen.

ed with it, but not a drop of urine will be found to have passed into the bladder; or the same thing happens when a ligature is thrown round the two ureters.

This experiment then seems to be a sufficient proof, that all the urine we evacuate, is conveyed to the kidneys through the emulgent arteries, in the manner we have described.—It is true, that wine and other liquors promote a speedy evacuation of urine: but the discharge seems to be merely the effect of the stimulus they occasion; by which the bladder and urinary parts are solicited to a more copious discharge of the urine, which was before in the body, and not immediately of that which was last drank; and this increased discharge, if the supply is kept up, will continue: nor will this appear wonderful, if we consider the great capacity of the vessels that go to the kidneys; the constant supply of fresh blood that is essential to health; and the rapidity with which it is incessantly circulated through the heart to all parts of the body.

SECT. XIII. *Of Digestion.*

102

WE are now proceeding to speak of *digestion*, which seems to be introduced in this place with propriety, after a description of the abdominal viscera, the greater part of which contribute to this function. By *digestion* is to be understood, the changes the aliment undergoes for the formation of chyle:—these changes are effected in the mouth, stomach, and small intestines.

The mouth, of which every body has a general knowledge, is the cavity between the two jaws, formed anteriorly and laterally by the lips, teeth, and cheeks, and terminating posteriorly in the throat.

The lips and cheeks are made up of fat and muscles, covered by the cuticle, which is continued over the whole inner surface of the mouth, like a fine and delicate membrane.—Beside this membrane, the inside of the mouth is furnished with a spongy and very vascular substance called the *gums*, by means of which the teeth are secured in their sockets. A similar substance covers the roof of the mouth, and forms what is called the *velum pendulum palati*, which is fixed to the extremity of the arch formed by the ossa maxillaria and ossa palati, and terminates in a soft, small, and conical body, named *uvula*; which appears, as it were, suspended from the middle of the arch over the basis of the tongue.

The *velum pendulum palati* performs the office of a valve between the cavity of the mouth and the pharynx, being moved by several muscles (F).

The tongue is composed of several muscles (G) which enable it to perform a variety of motions for the articulation of the voice; for the purposes of mastication; and for conveying the aliment into the pharynx. Its upper part is covered with papillæ, which constitute the organ of taste, and are easily to be distinguished; it is covered by the same membrane that lines the in-

side of the mouth, and which makes at its inferior part towards its basis a reduplication called *frænum*. Of the Abdomen

Posteriorly, under the *velum palati*, and at the basis of the tongue, is the pharynx; which is the beginning of the œsophagus, stretched out every way, so as to resemble the top of a funnel, through which the aliment passes into the stomach.

The mouth has a communication with the nostrils at its posterior and upper part; with the ears, by the Eustachian tubes; with the lungs, by means of the larynx; and with the stomach, by means of the œsophagus.

The pharynx is constantly moistened by a fluid, secreted by two considerable glands called the *tonsils*, one on each side of the *velum palati*. These glands, from their supposed resemblance to almonds, have likewise been called *amygdalus*.

The mouth is moistened by a considerable quantity of saliva. This fluid is derived from the *parotid glands*; a name which by its etymology points out their situation to be near the ears. They are two in number, one on each side under the os malæ: and they are of the conglomerate kind; being formed of many smaller glands, each of which sends out a very small excretory duct, which unites with the rest to form one common channel, that runs over the cheek, and piercing the buccinator muscle, opens into the mouth on each side, by an orifice into which a bristle may be easily introduced.—Besides these, the maxillary glands, which are placed near the inner surface of the angle of the lower jaw on each side; the sublingual glands, which are situated at the root of the tongue; the glands of the palate, which are seated in the *velum palati*; and those of the cheeks, lips, &c. together with many other less considerable ones,—pour the saliva into the mouth through their several excretory ducts.

The saliva, like all the other humours of the body, is found to be different in different people: but in general, it is a limpid and insipid fluid, without smell in healthy subjects; and these properties would seem to prove, that it contains very few saline or inflammable particles.

The uses of the saliva seem to be to moisten and lubricate the mouth, and to assist in reducing the aliment into a soft pulp before it is conveyed into the stomach.

The variety of functions which are constantly performed by the living body, must necessarily occasion a continual waste and dissipation of its several parts. A great quantity is every day thrown off by the insensible perspiration and other discharges; and were not these losses constantly recruited by a fresh supply of chyle, the body would soon effect its own dissolution. But Nature has very wisely favoured us with organs fitted to produce such a supply; and has at the same time endued us with the sensations of hunger and thirst, that our attention may not be diverted from the necessary business of nutrition. The sensation of hunger is universally

103

(F) These are the *circumflexus palati*, *levator palati mollis*, *palato-pharyngæus constrictor isthmi faucium*, and *azygos uvulæ*. See page 708.

(G) These are, the *genio-glossus*, *hyo-glossus*, *lingualis*, and *stylo-glossus*. See page 708.

Of the
Abdomen.

verfally known; but it would perhaps be difficult to describe it perfectly in words. It may, however, be defined to be a certain uneasy sensation in the stomach, which induces us to wish for solid food; and which likewise serves to point out the proper quantity, and time for taking it. In describing the stomach, mention was made of the gastric juice, as every where lubricating its inner coat. This humour mixes itself with the aliment in the stomach, and helps to prepare it for its passage into the intestines; but when the stomach is perfectly empty, this same fluid irritates the coats of the stomach itself, and produces the sensation of hunger.

A certain proportion of liquid aliment is required to assist in the process of digestion, and to afford that moisture to the body, of which there is such a constant dissipation.—Thirst induces us to take this necessary supply of drink; and the seat of this sensation is in the tongue, fauces, and œsophagus, which from their great sensibility are required to be kept moist: for though the fauces are naturally moistened by the mucus and salival juices; yet the blood, when deprived of its watery part or rendered acrimonious by any natural causes, never fails particularly to affect these parts, and the whole alimentary canal, and to occasion thirst.—This is the common effect of fevers and of hard labour, by both which too much of the watery part of the blood is dissipated.

104
Of mastication and
deglutition.

It has been observed, that the aliment undergoes some preparation in the mouth before it passes into the stomach; and this preparation is the effect of mastication. In treating of the upper and lower jaws, mention was made of the number and arrangement of the teeth. The upper jaw was described as being immovable; but the lower jaw was spoken of as being capable of elevation and depression, and of a grinding motion. The aliment, when first carried into the mouth, is pressed between the teeth of the two jaws by a very strong and frequent motion of the lower jaw; and the tongue and the cheeks assisting in this process, continue to replace the food between the teeth till it is perfectly divided, and reduced to the consistence of pulp. The incisores and canini divide it first into smaller pieces, but it is between the surfaces of the dentes molares by the grinding motion of the jaw that the mastication is completed.

During this process, the salival glands being gently compressed by the contraction of the muscles that move the lower jaw, pour out their saliva: this helps to divide and break down the food, which at length becomes a kind of pulp, and is then carried over the basis of the tongue into the fauces. But to effect this passage into the œsophagus, it is necessary that the other openings which were mentioned as having a communication with the mouth as well as the pharynx, should be closed; that none of the aliment, whether solid or liquid, may pass into them, whilst the pharynx alone is dilated to receive it:—And such a disposition actually takes place in a manner we will endeavour to describe.

The trachea arteria, or windpipe, through which the air is conveyed to the lungs, is placed before the œsophagus—in the act of swallowing; therefore, if the larynx (for so the upper part of the trachea is called) is not closed, the aliment will pass into it in its way to the œsophagus. But this is prevented by a

small and very elastic cartilage, called *epiglottis*, which is attached only to the fore-part of the larynx; so that the food in its passage to the œsophagus presses down this cartilage, which then covers the glottis or opening of the larynx; and at the same time the velum palati being capable of some degree of motion, is drawn backwards by its muscles, and closes the openings into the nose and the Eustachian tubes.—This, however, is not all. The larynx, which being composed of cartilaginous rings cannot fail in its ordinary state to compress the membranous canal of the œsophagus, is in the act of deglutition carried forwards and upwards by muscles destined for that purpose; and consequently drawing the fore-part of the pharynx with it, that opening is fully dilated. When the aliment has reached the pharynx, its descent is promoted by its own proper weight, and by the muscular fibres of the œsophagus, which continue to contract from above downwards, until the aliment has reached the stomach. That these fibres have no inconsiderable share in deglutition, any person may experience, by swallowing with his head downwards, when the descent of the aliment cannot possibly be effected by its weight.

It is necessary that the nostrils and the lungs should communicate with the mouth, for the purposes of speech and respiration: but if the most minute part of our food happens to be introduced into the trachea, it never fails to produce a violent cough, and sometimes the most alarming symptoms. This is liable to happen when we laugh or speak in the act of deglutition: the food is then said to have passed the wrong way. And indeed this is not improperly expressed: for death would soon follow, if the quantity of aliment introduced into the trachea should be sufficient to obstruct the respiration only during a very short time; or if the irritating particles of food should not soon be thrown up again by means of the cough, which in these cases very seasonably increases in proportion to the degree of irritation.

If the velum palati did not close the passage to the nostrils, deglutition would be performed with difficulty, and perhaps not at all; for the aliment would return through the nose, as is sometimes the case in drinking. Children, from a deficiency in this velum palati, have been seen to die a few hours after birth; and they who from disease or any other causes have not this part perfect, swallow with difficulty.

The aliment, after having been sufficiently divided by the action of the teeth, and attenuated by the saliva, is received into the stomach, where it is destined to undergo a more considerable change.

The properties of the aliment not being much altered at its first entrance into the stomach, and before it is thoroughly blended with the gastric juice, is capable of irritating the inner coat of the stomach to a certain degree, and occasions a contraction of its two orifices.—In this membranous bag, surrounded by the abdominal viscera, and with a certain degree of natural heat, the aliment undergoes a constant agitation by means of the abdominal muscles and of the diaphragm; and likewise by a certain contraction or expansion of the muscular fibres of the stomach itself. By this motion, every part of the food is exposed to the action of the gastric juice, which gradually divides and attenuates it, and prepares it for its passage into the intestines.

Some

Of the
Abdomen.

Of the
Abdomen.

Some observations lately published by Mr Hunter in the Philosophical Transactions, tend to throw considerable light on the principles of digestion. There are few dead bodies in which the stomach, at its great end, is not found to be in some degree digested (H). Animals, or parts of animals, possessed of the living principle, when taken into the stomach, are not in the least affected by the action of that viscus; but the moment they lose the living principle, they become subject to its digestive powers. This seems to be the case with the stomach, which is enabled to resist the action of its juices in the living body: but when deprived of the living principle, it is then no longer able to resist the powers of that menstruum, which it had itself formed for the digestion of its contents; the process of digestion appearing to be continued after death. This is confirmed by what happens in the stomachs of fishes: They frequently swallow, without mastication, fish which are larger than the digesting parts of their stomach can contain; and in such cases, that part which is taken into the stomach is more or less dissolved, while that part which remains in the œsophagus is perfectly found; and here, as well as in the human body, the digesting part of the stomach is often reduced to the same state as the digested part of the food. These appearances tend to prove, that digestion is not effected by a mechanical power, by contractions of the stomach, or by heat; but by a fluid secreted in the coats of the stomach, which is poured into its cavity, and there animalizes the food, or assimilates it to the nature of blood.

Hist. de l'Académie royale des Sciences, &c. pour 1784. mem. 15. From some late experiments by M. Sage, it appears, that inflammable air has the property of destroying and dissolving the animal texture: And as we swallow with the substances which serve us for food a great quantity of atmospherical air, M. Sage thinks it possible, that dephlogisticated, which is its principle, may be converted in the stomach into inflammable air, or may modify into inflammable air a portion of the oily substance which is the principle of aliments. In this case, would not the inflammable air (he asks), by dissolving our food, facilitate its conversion into chyle?

Be this as it may, the food, after having remained one, two, or three hours in the stomach, is converted into a greyish pulp, which is usually called *chymus*, a word of Greek etymology, signifying *juice*, and some few milky or chylous particles begin to appear.—But the term of its residence in this bag is proportioned to the nature of the aliment, and to the state of the stomach and its juices. The thinner and more perfectly digested parts of the food pass by a little at a time into the duodenum, through the pylorus, the fibres of which relax to afford it a passage; and the grosser and less digested par-

ticles remain in the stomach, till they acquire a sufficient fluidity to pass into the intestines, where the nature of the *chymus* is perfectly changed. The bile and pancreatic juice which flow into the duodenum, and the mucus, which is every where distilled from the surface of the intestines, mix themselves with the alimentary pulp, which they still farther attenuate and dissolve, and into which they seem to infuse new properties.

Two matters very different from each other in their nature and destination, are the result of this combination.—One of these, which is composed of the liquid parts of the aliment, and of some of its more solid particles, extremely divided and mixed with the juices we have described, constitutes a very mild, sweet, and whitish fluid, resembling milk, and distinguished by the name of *chyle*. This fluid is absorbed by the lacteal veins, which convey it into the circulation, where, by being assimilated into the nature of blood, it affords that supply of nutrition, which the continual waste of the body is found to require.—The other, is the remains of the alimentary mass deprived of all its nutritious particles, and containing only such parts as were rejected by the absorbing mouths of the lacteals. This grosser part, called the *feces*, passes on through the course of the intestines, to be voided at the anus, as will be explained hereafter; for this process in the œconomy cannot be well understood till the motion of respiration has been explained. But the structure of the intestines is a subject which may be properly described in this place, and deserves to be attended to.

It has been already observed, that the intestinal canal is five or six times as long as the body, and that it forms many circumvolutions in the cavity of the abdomen, which it traverses from the right to the left, and again from the left to the right; in one place descending, and in another extending itself upwards. It was noticed likewise, that the inner coat of the intestines, by being more capacious than their exterior tunics, formed a multitude of plaits placed at a certain distance from each other, and called *valvula conniventes*. Now this disposition will be found to afford a farther proof of that divine wisdom, which the anatomist and physiologist cannot fail to discover in all their pursuits.—For if the intestinal canal was much shorter than it naturally is; if instead of the present circumvolutions it passed in a direct course from the stomach; and if its inner surface was smooth and destitute of valves; the aliment would consequently pass with great rapidity to the anus, and sufficient time would be wanting to assimilate the chyle, and for the necessary absorption of it into the lacteals: so that the body would be deprived of the supply of nutrition, which is so essential to life and health; but the length and circumvolutions of the intestines, the inequality of their internal surface,

(H) The Abbé Spallanzani, who has lately written upon digestion, finds, from a variety of experiments, made upon quadrupeds, birds, and fishes, that digestion goes on for some time after death, though far less considerable than in living animals; but heat is necessary in many animals, or at least promotes it in a much greater degree. He found also, that when the stomach was cut out of the body, it had somewhat of the power of digestion, though this was trifling when compared with that which took place when the stomach was left in the body. In not one of the animals was the great curvature of the stomach dissolved, or much eroded after death. There was often a little erosion, especially in different fishes; in which, when he had cleared the stomach of its contents, the internal coat was wanting. In other animals there was only a slight excoriation; and the injury

Of the Abdomen. face, and the course of the aliment through them, all concur to perfect the separation of the chyle from the fæces, and to afford the necessary nourishment to the body.

SECT. XIV. *Of the Course of the Chyle, and of the Lymphatic System.*

105. AN infinite number of very minute vessels, called the *lacteal veins*, arise like net-work from the inner surface of the intestines, (but principally from the *jejunum* and *ileum*), which are destined to imbibe the nutritious fluid or chyle. These vessels, which were discovered by Asellius in 1622 (1), pass obliquely through the coats of the intestine, and running along the mesentery, unite as they advance, and form larger branches, all of which pass through the mesenteric or conglobate glands, which are very numerous in the human subject. As they run between the intestines and these glands, they are styled *vena lactea primi generis*: but after leaving these glands, they are found to be less numerous, and being increased in size, are then called *vena lactea secundi generis*, which go to deposite their contents in the *thoracic duct*, through which the chyle is conveyed into the blood.

This *thoracic duct* begins about the lower part of the first vertebra lumborum, from whence it passes up by the side of the aorta, between that and the *vena azygos*, close to the vertebræ, being covered by the pleura. Sometimes it is found divided into two branches; but they usually unite again into one canal, which opens into the left subclavian vein, after having run a little way in an oblique course between its coats. The subclavian vein communicates with the *vena cava*, which passes to the right auricle of the heart.

The lower part of this duct being usually larger than any other part of it, has been named *receptaculum chyli*, or *Pecquet's receptacle*, in honour of the anatomist who first discovered it in 1651. In some quadrupeds, in turtle and in fish, this enlargement * is more considerable in proportion to the size of the duct, than it u-

sually is in the human subject, where it is not commonly found large enough to merit the name of *receptaculum*.

Opportunities of observing the lacteals in the human subject do not often occur; but they may be easily demonstrated in a dog or any other quadruped that is killed two or three hours after feeding upon milk, for then they appear filled with white chyle.

But these *lacteals* which we have described, as passing from the intestines through the mesentery to the thoracic duct, compose only a part of a system of vessels which perform the office of *absorption*, and which constitute, with their common trunk, the thoracic duct, and the conglobate glands that are dispersed throughout the body, what may be styled the *lymphatic system*. So that what is said of the structure of one of these series of vessels may very properly be applied to that of the other.

106. The *lymphatic veins* (κ) are minute pellucid tubes, Lymphatic vessels. which, like the lacteals, direct their course towards the centre of the body, where they pour a colourless fluid into the thoracic duct. The lymphatics from all the lower parts of the body gradually unite as they approach this duct, into which they enter by three or four very large trunks, that seem to form the lower extremity of this canal, or *receptaculum chyli*, which may be considered as the great trunk of the lymphatic system. The lacteals open into it near the same place; and the lymphatics, from a large share of the upper parts of the body, pour their lymph into different parts of this duct as it runs upwards, to terminate in the left subclavian vein. The lymphatics from the right side of the neck, thorax, and right arm, &c. terminate in the right subclavian vein.

As the lymphatics commonly lie close to the large blood-vessels, a ligature passed round the crural artery in a living animal, by including the lymphatics, will occasion a distension of these vessels below the ligature, so as to demonstrate them with ease; and a ligature passed round the thoracic duct, instantly after killing an animal, will, by stopping the course of its contents into

jury in all of them was at the inferior part, or great curvature. The coats of the stomach suffer less after death than flesh or part of the stomach of similar animals put into it: The author assigns, as a reason for this, that these bodies are invested on all sides by the gastric fluid, whereas it only acts on the internal surface of the stomach.

(1) We are informed by Galen, that the lacteals had been seen in kids by Erasistratus, who considered them as arteries carrying a milky fluid: but from the remote time in which he lived, they do not seem to have been noticed till they were discovered in a living dog by Asellius, who denominated them *lacteals*, and considered them as serving to convey the chyle from the intestines to the liver; for before the discovery of the thoracic duct, the use of the liver was universally supposed to be that of converting the chyle into blood. But the discovery of the thoracic duct by Pecquet, not long after, corrected this error. Pecquet very candidly confesses, that his discovery accidentally arose from his observing a white fluid, mixed with the blood, flowing out of the *vena cava*, after he had cut off the heart of a living dog; which he suspected to be chyle, and afterwards traced to its source from the thoracic duct: This duct had been seen near an hundred years before in a horse by Eustachius, who speaks of it as a vein of a particular structure, but without knowing any thing of its termination or use.

(κ) The arteries in their course through the body becoming gradually too minute to admit the red globules of the blood, have then been styled *capillary* or *lymphatic arteries*. The vessels which are here described as constituting the lymphatic system, were at first supposed to be continued from those arteries, and to convey back the lymph, either into the red veins or the thoracic duct; the office of absorption having been attributed to the *red veins*. But we know that the *lymphatic veins* are not continuations of the *lymphatic arteries*, but that they constitute the *absorbent system*. There are still, however, some very respectable names among the anatomists of the present age, who contend, that the red veins act likewise as absorbents:—but it seems to have been clearly proved, that the red veins do absorb nowhere but in the cavernous cells of the penis, the erection of which is occasioned by a distension of those cells with arterial blood.

Of the
Abdomen

into the subclavian vein, distend not only the lacteals, but also the lymphatics in the abdomen and lower extremities, with their natural fluids (1).

The coats of these vessels are too thin to be separated from each other; but the mercury they are capable of sustaining, proves them to be very strong; and their great power of contraction, after undergoing considerable distension, together with the irritability with which Baron Haller found them to be endued*, seems to render it probable, that, like the blood-vessels, they have a muscular coat.

* Sur le
mouvement
du sang. Ex.
295, 298.

The lymphatics are nourished after the same manner as all the other parts of the body. For even the most minute of these vessels are probably supplied with still more minute arteries and veins. This seems to be proved by the inflammation of which they are susceptible; and the painful swellings which sometimes take place in lymphatic vessels, prove that they have nerves as well as blood-vessels.

Both the lacteals, lymphatics, and thoracic duct, are furnished with valves, which are much more common in these vessels than in the red veins. These valves are usually in pairs, and serve to promote the course of the chyle and lymph towards the thoracic duct, and to prevent its return. Mention has been made of the glands, through which the lacteals pass in their course through the mesentery; and it is to be observed, that the lymphatics pass through similar glands in their way to the thoracic duct. These glands are all of the conglobate kind, but the changes which the chyle and lymph undergo in their passage through them, have not yet been ascertained.

The *lymphatic vessels* begin from surfaces and cavities in all parts of the body as *absorbents*. This is a fact now universally allowed; but how the fluids they absorb are poured into those cavities, is a subject of controversy. The contents of the abdomen, for instance, were described as being constantly moistened by a very thin watery fluid. The same thing takes place in the pericardium, pleura, and all the other cavities of the body, and this watery fluid is the *lymph*. But whether it is exhaled into those cavities through the minute ends of arteries, or transfused through their coats, are the points in dispute. We cannot here be permitted to relate the many ingenious arguments that have been advanced in favour of each of these opinions; nor is it perhaps of consequence to our present purpose to enter into the dispute. It will be sufficient if the reader can form an idea of what the lymph is, and of the manner in which it is absorbed.

The *lymph*, from its transparency and want of colour, would seem to be nothing but water; and hence
N° 19.

the first discoverers of these vessels styled them *ductus aquosi*: but experiments prove, that the lymph of an healthy animal coagulates by being exposed to the air, or a certain degree of heat, and likewise by being suffered to rest; seeming to agree in this property with that part of the blood called the *coagulable lymph*.— This property of the lymph leads to determine its use, in moistening and lubricating the several cavities of the body in which it is found; and for which, by its gelatinous principle, it seems to be much better calculated than a pure and watery fluid would be, for such it has been supposed to be by some anatomists.

The mouths of the *lymphatics* and *lacteals*, by acting as capillary tubes, seem to absorb the *lymph* and *chyle* somewhat in the same manner as a capillary tube of glass, when put into a basin of water, is enabled to attract the water into it to a certain height: but it is probable that they likewise possess a living power, which assists in performing this office. In the human body the *lymph*, or the *chyle*, is probably conveyed upon this principle as far as the first pair of valves, which seem to be placed not far from the orifice of the absorbing vessel, whether *lymphatic* or *lacteal*; and the fluid will then be propelled forwards, by a continuation of the absorption at the orifice. But this does not seem to be the only inducement to its progress towards the thoracic duct; these vessels have probably a muscular coat, which may serve to press the fluid forwards from one pair of valves to another; and as the large lymphatic vessels and the thoracic duct are placed close to the large arteries, which have a considerable pulsation, it is reasonable to suppose, that they derive some advantages from this situation.

SECT. XV. Of the Generative Organs; of Conception, &c.

§ 1. The Male Organs.

THE male organs of generation have been usually divided into the parts which serve to prepare the semen from the blood, and those which are destined to convey it into the womb. But it seems to be more proper to distinguish them into the *preparing*, the *containing*, and the *expelling* parts, which are the different offices of the *testes*, the *vesiculæ seminales*, and the *penis*; and this is the order in which we propose to describe them.

The *testes* are two glandular bodies, serving to secrete the semen from the blood. They are originally formed and lodged within the cavity of the abdomen; and it is not till after the child is born, or very near that time, that they begin to pass into the groin, and from thence into the scrotum (M). By this disposition they

107

(1) In the dead body they may be easily demonstrated by opening the artery ramifying through any viscus, as in the spleen, for instance, and then throwing in air; by which the lymphatics will be distended. One of them may then be punctured, and mercury introduced into it through a blow-pipe.

(M) It sometimes happens in dissecting ruptures, that the intestine is found in the same sac, and in contact with the testis. This appearance was at first attributed to a supposed laceration of the peritoneum; but later observations, by pointing out the situation of the testicles in the foetus, have led to prove, that the testis, as it descends into the scrotum, carries with it a portion or elongation of the peritoneum, which becomes its tunica vaginalis, or a kind of sac, in which the testicle is lodged, as will be explained in the course of this section. The communication between this sac and the cavity of the abdomen, is usually soon cut off; but in some subjects

Of the they are very wisely protected from the injuries to
Abdomen. which they would be liable to be exposed, from the dif-
ferent positions of the child at the time of parturition.

The testicles in this state are loosely attached to the psoæ muscles, by means of the peritoneum by which they are covered; and they are at this time of life connected in a very particular manner to the parietes of the abdomen, and likewise to the scrotum, by means of a substance which Mr Hunter calls the *ligament* or *gubernaculum testis*, because it connects the testis with the scrotum, and directs its course in its descent. This gubernaculum is of a pyramidal form, with its bulbous head fixed to the lower end of the testis and epididymis, and loses its lower and slender extremity in the cellular membrane of the scrotum. It is difficult to ascertain what the structure and composition of this gubernaculum is, but it is certainly vascular and fibrous; and from certain circumstances, it would seem to be in part composed of the cremaster muscle, running upwards to join the lower end of the testis.

We are not to suppose that the testicle, when descended into the scrotum, is to be seen loose as a piece of gut or omentum would be in a common hernial sac. We have already observed, that during its residence in the cavity of the abdomen it is attached to the peritoneum, which descends with it; so that when the sac is completed in the scrotum, the testicle is at first attached only to the posterior part of it, while the fore part of it lies loose, and for some time affords a communication with the abdomen. The spermatic chord, which is made up of the spermatic artery and vein, and of the vas deferens or excretory duct of the testis, is closely attached behind to the posterior part of this elongation of the peritoneum. But the fore part of the peritoneal sac, which is at first loose and not attached to the testicle, closes after a certain time, and becomes united to the posterior part, and thus perfectly surrounds the testicle as it were in a purse.

The testicles of the fœtus differ only in their size and situation from those of the adult. In their passage from the abdomen they descend through the abdominal rings into the scrotum, where they are supported and defended by various integuments.

What the immediate cause of this descent is, has not yet been satisfactorily determined. It has been ascribed to the effects of respiration, but the testicles have sometimes been found in the scrotum before the child has breathed; and it does not seem to be occasioned by the action of the cremaster muscle, because the same effect would be liable to happen in the hedgehog, and some other quadrupeds, whose testicles remain in the abdomen during life.

VOL. I. Part II.

The scrotum, which is the external or common covering of both testicles, is a kind of sac formed by the common integuments, and externally divided into two equal parts by a prominent line called *raphe*.

In the inner part of the scrotum we meet with a cellular coat called *dartos* (N), which by its duplication divides the scrotum into two equal parts, and forms what is called *septum scroti*, which corresponds with the raphe. The collapion which is so often observed to take place in the scrotum of the healthy subject, when excited by cold or by the stimulus of venery, seems to be very properly attributed to the contractile motion of the skin, and not to any muscular fibres, as is the case in dogs and some other quadrupeds.

The scrotum, then, by means of its septum, is found to make two distinct bags, in which the testicles, invested by their proper tunics, are securely lodged and separated from each other. These coats are the cremaster, the tunica vaginalis, and the tunica albuginea. The first of these is composed of muscular fibres, and is to be considered only as a partial covering of the testis; for it surrounds only the spermatic chord, and terminates upon the upper and external parts of the tunica vaginalis testis, serving to draw up and suspend the testicle (O). The tunica vaginalis testis has already been described as being a thin production of the peritoneum, loosely adhering every where to the testicle, which it includes as it were in a bag. The tunica albuginea is a firm, white, and very compact membrane of a glistening appearance, which immediately invests the body of the testis and the epididymis; serving in some measure to connect them to each other, but without extending itself at all to the spermatic chord. This tunica albuginea serves to confine the growth of the testis and epididymis within certain limits, and by giving them a due degree of firmness, enables them to perform their proper functions.

Having removed this last tunic, we discover the substance of the testicle itself, which appears to be made up of an infinite number of very elastic filaments, which may be best distinguished after macerating the testicle in water. Each testicle is made up of the spermatic artery and vein, and the excretory vessels or tubuli seminiferi. There are likewise a great number of absorbent vessels, and some branches of nerves to be met with in the testicles.

The spermatic arteries arise one on each side from the aorta, generally about an inch below the emulgent. The right spermatic vein commonly passes into the vena cava; but the left spermatic vein usually empties itself into the emulgent on that side; and it is suspended

5 A

posed

jects it continues open during life; and when an hernia or descent of the intestine takes place in such a subject, it does not push down a portion of the peritoneum before it, as it must otherwise necessarily do, but passes at once through this opening, and comes in contact with the naked testicle, constituting that particular species of rupture called *hernia congenita*.

(N) The dartos has usually been considered as a muscle, and is described as such both by Douglas and Winslow. But there being no part of the scrotum of the human subject which can be said to consist of muscular fibres, Albinus and Haller have very properly omitted to describe the dartos as a muscle, and consider it merely as a cellular coat.

(O) The cremaster muscle is composed of a few fibres from the obliquus internus abdominis, which uniting with a few from the transversalis, descend upon the spermatic chord, and are insensibly lost upon the tunica vaginalis of the testicle. It serves to suspend and draw up the testicle.

Of the
Abdomen.

posed to take this course into the emulgent, that it may avoid passing over the aorta, which it would be obliged to do in its way to the vena cava.

The blood is circulated very slowly through the spermatic artery, which makes an infinite number of circumvolutions in the substance of the testicle, where it deposits the semen, which passes through the tubuli seminiferi. These tubuli seminiferi are seen running in short waves from the tunica albuginea to the axis of the testicle; and are divided into distinct portions by certain thin membranous productions, which originate from the tunica albuginea. They at length unite, and by an infinite number of convolutions form a sort of appendix to the testis called *epididymis* (p), which is a vascular body of an oblong shape, situate upon the superior part of each testicle. These tubuli of the epididymis at length form an excretory duct called *vas deferens*, which ascends towards the abdominal rings, with the other parts that make up the spermatic chord, and then a separation takes place; the nerves and blood-vessels passing on to their several terminations, and the *vas deferens* going to deposit its semen in the vesiculæ seminales, which are two soft bodies of a white and convoluted appearance externally, situated obliquely between the rectum and the lower part of the bladder, and uniting together at the lower extremity. From these reservoirs (q), which are plentifully supplied with blood-vessels and nerves, the semen is occasionally discharged through two short passages, which open into the urethra close to a little eminence called *verumontanum*.

Of the
Abdomen.

Near this eminence we meet with the prostate, which is situated at the neck of the bladder, and is described as being of a glandular structure. It is shaped somewhat like a heart with its small end foremost, and invests the origin of the urethra. Internally it appears to be of a firm substance, and composed of several follicles, secreting a whitish viscid fluid, that is discharged by ten or twelve excretory ducts into the urethra, on each side of the openings of the vesiculæ seminales at the same time, and from the same causes that the semen is expelled. As this latter fluid is found to be exceedingly limpid in the vesiculæ seminales of the dead subject, it probably owes its whiteness and viscosity to this liquor of the prostate.

The penis, which is to be considered as the vehicle or active organ of procreation, is composed of two columns, the corpora cavernosa and corpus spongiosum. The corpora cavernosa, which constitute the greatest part of the penis, may be described as two cylindrical ligamentous tubes, each of which is composed of an infinite number of minute cells of a spongy texture, which communicate with each other. These two bodies are of a very pliant texture, and capable of considerable distension; and being united laterally to each other, occasion by this union a space above and another below. The uppermost of these spaces is filled by the blood-vessels, and the lower one, which is larger than the other, by the urethra and its corpus spongiosum. These two cavernous bodies are at first only separated by a partition of tendinous fibres, which allow them to communicate with each other; but they afterwards

(p) The testicles were named *didymi* by the ancients, and the name of this part was given to it on account of its situation upon the testicle.

(q) That the bags called *vesiculæ seminales* are reservoirs of semen, is a circumstance which has been by anatomists universally believed. Mr J. Hunter, however, from several circumstances, has been induced to think this opinion erroneous.

He has examined these vesiculæ in people who have died suddenly, and he found their contents to be different in their properties from the semen. In those who had lost one of the testicles, or the use of one of them by disease, both the vesiculæ were full, and their contents similar. And in a *lusus naturæ*, where there was no communication between the vasa deferentia and vesiculæ, nor between the vesiculæ and penis, the same thing took place.

From these observations, he thinks we have a presumptive proof, that the semen can be absorbed in the body of the testicle and in the epididymis, and that the vesiculæ secrete a mucus which they are capable of absorbing when it cannot be made use of: That the semen is not retained in reservoirs after it is secreted, and kept there till it is used; but that it is secreted at the time, in consequence of certain affections of the mind stimulating the testicles to this action.

He corroborates his observations by the appearance on dissection in other animals; and here he finds, that the shape and contents of the vesiculæ vary much in different animals, while the semen in most of them he has examined is nearly the same: That the vasa deferentia in many animals do not communicate with the vesiculæ: That the contents of the vesiculæ of castrated and perfect animals are similar, and nearly equal in quantity, in no way resembling the semen as emitted from the animal *in coitu*, or what is found in the *vas deferens* after death. He observes likewise, that the bulb of the urethra of perfect males is considerably larger than in castrated animals.

From the whole, he thinks the following inferences may be fairly drawn: That the bags called *vesiculæ seminales* are not seminal reservoirs, but glands secreting a peculiar mucus; and that the bulb of the urethra is properly speaking the receptacle of the semen, in which it is accumulated previous to ejection.

But although he has endeavoured to prove that the vesiculæ do not contain the semen, he has not been able to ascertain their particular use. He thinks, however, we may be allowed upon the whole to conclude, that they are, together with other parts, subservient to the purposes of generation.

Although the author has treated this subject very ably, and made many ingenious observations, some things may be objected to what he has advanced; of which the following are a few: That those animals who have

bags

Of the
Abdomen.

wards devaricate from each other like the branches of the letter Y, and diminishing gradually in size, are attached, one on each side, by means of the ligamentum suspensorium penis to the ramus ischii, and to the inferior portion of the os pubis.

The corpus spongiosum penis, or corpus spongiosum urethrae, as it is styled by some authors, begins as soon as the urethra has passed the prostate, with a thick origin almost like a heart, first under the urethra, and afterwards above it, becoming gradually thinner, and surrounding the whole canal of the urethra, till it terminates in a considerable expansion, and constitutes what is called the *glans penis*, which is exceedingly vascular, and covered with papillae like the tongue. The cuticle which lines the inner surface of the urethra, is continued over the glans in the same manner as it is spread over the lips.

The penis is invested by the common integuments, but the cutis is reflected back every where from the glans as it is in the eye-lids; so that it covers this part, when the penis is in a relaxed state, as it were with a hood, and from this use is called *prepuce*.

The prepuce is tied down to the under part of the glans by a small ligament called *frænum*, which is in fact only a continuation of the cuticle and cutis. There are many simple sebaceous follicles called *glandulae odoriferae*, placed round the basis of the glans; and the fluid they secrete serves to preserve the exquisite sensibility of this part of the penis, and to prevent the ill effects of attrition from the prepuce.

The urethra may be defined to be a membranous canal, passing from the bladder through the whole extent of the penis. Several very small openings, called *lacunae*, communicate with this canal, through which a mucus is discharged into it; and besides these, there are two glands, first described by Cowper, as secreting a fluid for lubricating the urethra, and called *Cowper's glands* (R); and Littre * speaks of a gland situated near the prostate, as being destined for the same use.

**Memoires de l'Acad. Royale des Sciences*, 1700.

The urethra being continued from the neck of the bladder, is to be considered as making part of the urinary passage; and it likewise affords a conveyance to the semen, which we have observed is occasionally discharged into it from the vesiculæ seminales. The direction of this canal being first under and then before the pubis, occasion a winding in its course from the bladder to the penis, not unlike the turns of the letter S.

The penis has three pair of muscles, the *erectores*, *acceleratores*, and *transversales*. They push the blood

from the crura to the fore part of the corpora cavernosa. They first originate from the tuberosity of the ischium, and terminate in the corpora cavernosa. The *acceleratores* arise from the sphincter, and by their insertion serve to compress the bulbous part of the urethra; and the *transversales* are destined to afford a passage to the semen, by dilating the canal of the urethra.

Of the
Abdomen.

The arteries of the penis are chiefly derived from the internal iliacs. Some of them are supposed to terminate by pabulous orifices within the corpora cavernosa and corpus spongiosum; and others terminate in veins, which at last make up the vena magna dorsii penis, and other smaller veins, which are in general distributed in like order with the arteries.

Its nerves are large and numerous. They arise from the great sciatic nerve, and accompany the arteries in their course through the penis.

We have now described the anatomy of this organ; and there only remains to be explained, how it is enabled to attain that degree of firmness and distension which is essential to the great work of generation.

The greatest part of the penis has been spoken of as being of a spongy and cellular texture, plentifully supplied with blood-vessels and nerves, and as having muscles to move it in different directions. Now, the blood is constantly passing into its cells through the small branches of the arteries which open into them, and is from thence as constantly returned by the veins, so long as the corpora cavernosa and corpus spongiosum continue to be in a relaxed and pliant state. But when, from any nervous influence, or other means, which it is not necessary here to define or explain, the *erectores penis*, *ejaculatores seminis*, *levatores ani*, &c. are induced to contract, the veins undergo a certain degree of compression, and the passage of the blood through them is so much impeded, that it collects in them in a greater proportion than they are enabled to carry off, so that the penis gradually enlarges; and being more and more forcibly drawn up against the os pubis, the vena magna itself is at length compressed, and the penis becomes fully distended. But as the causes which first occasioned this distension subside, the penis gradually returns to its state of relaxation.

§ 2. Female Organs of Generation.

ANATOMICAL writers usually divide the female organs of generation into *external* and *internal*. In the first division they include the *mons veneris*, *labia pudendi*, *perinaeum*, *clitoris*, *nymphae*, and *caruncula myrtiformis*;

5 A 2

103

bags called *vesiculæ seminales* perform copulation quickly; whereas others that want them, as in the dog kind, are tedious in copulation: That in the human body, at least, there is a free communication between the vasa deferentia and vesiculæ; and in animals where the author has observed no communication between the vasa deferentia and vesiculæ, there may be a communication by vessels not yet discovered, and which may be compared to the hepato-cystic ducts in fowls and fishes: That the fluid in the end of the vasa deferentia and the vesiculæ seminales are similar, according to the author's own observation: That the vesiculæ in some animals increase and decrease with the testicle at particular seasons: That in birds and certain fishes, there is a dilatation of the ends of the vasa deferentia, which the author himself allows to be a reservoir for the semen.

With respect to the circumstance of the bulb of the urethra answering the purpose of a reservoir, the author has mentioned no facts which tend to establish this opinion. See *Observations on certain Parts of the Animal Economy*.

(R) Both Heister and Morgagni observe, that they have sometimes not been able to find these glands; so that they do not seem to exist in all subjects.

Of the Abdomen. *mes*; and in the latter, the *vagina*, with the *uterus* and its appendages.

The *mons veneris*, which is placed on the upper part of the symphysis pubis, is internally composed of adipose membranes, which makes it soft and prominent: it divides into two parts called *labia pudendi*, which descending towards the rectum, from which they are divided by the perinæum, form what is called the *fourchette*. The perinæum is that fleshy space which extends about an inch and an half from the fourchette to the anus, and from thence about two inches to the coccyx.

The labia pudendi being separated, we observe a fulcus called *fossa magna*; in the upper part of which is placed the clitoris, a small round spongy body, in some measure resembling the male penis, but impervious, composed of two corpora cavernosa, arising from the tuberosities of the ossa ischii; furnished with two pair of muscles, the *erectores clitoridis*, and the sphincter or constrictor ostii vaginae; and terminating in a glans, which is covered with its prepuce. From the lower part, on each side of the fossa, pass the nymphæ, two membranous and spongy folds which seem destined for useful purposes in parturition, by tending to enlarge the volume of the vagina as the child's head passes through it. Between these, about the middle of the fossa magna, we perceive the orifice of the vagina or os externum, closed by folds and wrinkles; and about half an inch above this, and about an inch below the clitoris, appears the meatus urinarius or orifice of the urethra, much shorter, though somewhat larger, than in men, with a little prominence at its lower edge, which facilitates the introduction of the catheter.

The os externum is surrounded internally by several membranous folds called *carunculae myrtiformes*, which are partly the remains of a thin membrane called *hymen*, that covers the vagina in children. In general the hymen is sufficiently open to admit the passage of the menses, if it exists at the time of their appearance; sometimes, however, it has been found perfectly closed.

The vagina, situated between the urethra and the rectum, is a membranous cavity, surrounded especially at its external extremity with a spongy and vascular substance, which is covered by the sphincter ostii vaginae. It terminates in the uterus, about half an inch above the os tincæ, and is wider and shorter in women who have had children than in virgins.

All these parts are plentifully supplied with blood-vessels and nerves. Around the nymphæ there are sebaceous follicles, which pour out a fluid to lubricate the inner surface of the vagina; and the meatus urinarius, like the urethra in the male subject, is constantly moistened by a mucus, which defends it against the acrimony of the urine.

The *uterus* is a hollow viscus, situated in the hypogastric region, between the rectum and bladder. It is destined to receive the first rudiments of the fœtus, and to assist in the developement of all its parts, till it arrives at a state of perfection, and is fitted to enter into the world, at the time appointed by the wise Author of nature.

The uterus, in its unimpregnated state, resembles a pear in shape, somewhat flattened, with its fundus or bottom part turned towards the abdomen, and its cer-

vix or neck surrounded by the vagina. The entrance into its cavity forms a little protuberance, which has been compared to the mouth of a tench, and is therefore called *ostium*.

The substance of the uterus, which is of a considerable thickness, appears to be composed of muscular and small ligamentous fibres; small branches of nerves, some lymphatics, and with arteries and veins innumerable. Its nerves are chiefly derived from the intercostal, and its arteries and veins from the hypogastric and spermatic. The membrane which lines its cervix, is a continuation of the inner membrane of the vagina; but the outer surface of the body of the uterus is covered with the peritonæum, which is reflected over it, and descends from thence to the intestinum rectum. This duplication of the peritonæum, by passing off from the sides of the uterus to the sides of the pelvis, is there firmly connected, and forms what are called *ligamenta uteri lata*; which not only serve to support the uterus, but to convey nerves and blood vessels to it.

The *ligamenta uteri rotunda* arise from the sides of the fundus uteri, and passing along within the fore-part of the ligamenta lata, descend through the abdominal rings, and terminate in the substance of the mons veneris. The substance of these ligaments is vascular, and although both they and the ligamenta lata admit the uterus in the virgin state, to move only about an inch up and down, yet in the course of pregnancy they admit of considerable distension, and after parturition return nearly to their original state with surprising quickness.

On each side of the inner surface of the uterus, in the angle near the fundus, a small orifice is to be discovered, which is the beginning of one of the tubæ Fallopianæ. Each of these tubes, which are two in number, passing through the substance of the uterus, is extended along the broad ligaments, till it reaches the edge of the pelvis, from whence it reflects back; and turning over behind the ligaments, about an inch of its extremity is seen hanging loose in the pelvis, near the ovary. These extremities, having a jagged appearance, are called *fimbriæ*, or *morjæ diaboli*. Each tuba Fallopiana is usually about three or four inches long. Their cavities are at first very small, but becomes gradually larger, like a trumpet, as they approach the fimbriæ.

Near the fimbriæ of each tuba Fallopiana, about an inch from the uterus, is situated an oval body called *ovarium*, of about half the size of the male testicle. Each of these ovaria is covered by a production of the peritonæum, and hangs loose in the pelvis. They are of a flat and angular form, and appear to be composed of a white and cellular substance, in which we are able to discover several minute vesicles filled with a coagulable lymph, of an uncertain number, commonly exceeding 12 in each ovary. In the female of riper years, these vesicles become exceedingly turgid, and a kind of yellow coagulum is gradually formed within one of them, which increases for a certain time. In conception, one of these mature ova is supposed to be impregnated with the male semen, and to be squeezed out of its nidus into the Fallopian tube; after which the ruptured part forms a substance which in some animals is of a yellow colour, and is therefore called *corpus luteum*; and it is observable, that the number of these scars or fissures

Of the Abdomen. fissures in the ovarium, constantly corresponds with the number of fœtuses excluded by the mother.

§ 3. Of Conception.

109

MAN, being ever curious and inquisitive, has naturally been led to inquire after the origin of his existence; and the subject of generation has employed the philosophical world in all ages: but in following nature up to her minute recesses, the philosopher soon finds himself bewildered, and his imagination often supplies that which he so eagerly wishes to discover, but which is destined perhaps never to be revealed to him. Of the many theories which have been formed on this subject, that of the ancient philosophers seems to have been the most simple: they considered the male semen as alone capable of forming the fœtus, and believed that the female only afforded it a lodging in the womb, and supplied it with nourishment after it was perfectly formed. This opinion, however, soon gave place to another, in which the female was allowed a more considerable share in conception.

This second system considered the fœtus as being formed by the mixture of the seminal liquor of both sexes, by a certain arrangement of its several particles in the uterus. But in the 16th century, vesicles or eggs were discovered in the ovaria or female testicles; the fœtus had been found sometimes in the abdomen, and sometimes in the Fallopian tubes; and the two former opinions were exploded in favour of a new doctrine. The ovaria were compared to a bunch of grapes, being supposed to consist of vesicles, each of which had a stalk; so that it might be disengaged without hurting the rest, or spilling the liquor it contained. Each vesicle was said to include a little animal, almost complete in all its parts; and the vapour of the male semen being conveyed to the ovarium, was supposed to produce a fermentation in the vesicle, which approached the nearest to maturity; and thus inducing it to disengage itself from the ovarium, it passed into the tuba Fallopiana, thro' which it was conveyed to the uterus. Here it was supposed to take root like a vegetable seed, and to form, with the vessels originating from the uterus, what is called the *placenta*; by means of which the circulation is carried on between the mother and the fœtus.

This opinion, with all its absurdities, continued to be almost universally adopted till the close of the same century, when Leeuwenhoeck, by means of his glasses, discovered certain opaque particles, which he described as so many animalcula, floating in the seminal fluid of the male.

This discovery introduced a new schism among the philosophers of that time, and gave rise to a system which is not yet entirely exploded. According to this theory, the male semen passing into the tubæ Fallopianæ, one of the animalcula penetrates into the substance of the ovarium, and enters into one of its vesicles or ova. This impregnated ovum is then squeezed from its husk, through the coats of the ovarium, and being seized by the fimbriæ, is conducted through the tube to the uterus, where it is nourished till it arrives at a

state of perfection. In this system there is much ingenuity; but there are certain circumstances supposed to take place, which have been hitherto inexplicable. A celebrated modern writer, M. Buffon, endeavours to restore, in some measure, the most ancient opinion, by allowing the female semen a share in this office; asserting, that animalcula or organic particles are to be discovered in the seminal liquor of both sexes: he derives the female semen from the ovaria, and he contends that no ovum exists in those parts. But in this idea he is evidently mistaken; and the opinion now most generally adopted is, that an impregnation of the ovum, by the influence of the male semen, is essential to conception. That the ovum is to be impregnated, there can be no doubt; but as the manner in which such an impregnation is supposed to take place, and the means by which the ovum afterwards gets into the Fallopian tube, and from thence into the uterus, are still founded chiefly on hypothesis, we will not attempt to extend farther the investigation of a subject concerning which so little can be advanced with certainty.

§ 4. Of the Fœtus in Utero.

OPPORTUNITIES of dissecting the human gravid uterus occurring but seldom, the state of the embryo (s) immediately after conception cannot be perfectly known.

When the ovum descends into the uterus, it is supposed to be very minute; and it is not till a considerable time after conception that the rudiments of the embryo begin to be ascertained.

About the third or fourth week the eye may discover the first lineaments of the fœtus; but these lineaments are as yet very imperfect, it being only about the size of a house-fly. Two little vesicles appear in an almost transparent jelly; the largest of which is destined to become the head of the fœtus, and the other smaller one is reserved for the trunk. But at this period no extremities are to be seen; the umbilical cord appears only as a very minute thread, and the placenta does not as yet absorb the red particles of the blood. At six weeks, not only the head, but the features of the face begin to be developed. The nose appears like a small prominent line, and we are able to discover another line under it, which is destined for the separation of the lips. Two black points appear in the place of eyes, and two minute holes mark the ears. At the sides of the trunk, both above and below, we see four minute protuberances, which are the rudiments of the arms and legs. At the end of eight weeks the body of the fœtus is upwards of an inch in length, and both the hands and feet are to be distinguished. The upper extremities are found to increase faster than the lower ones, and the separation of the fingers is accomplished sooner than that of the toes.

At this period the human form may be decisively ascertained; all the parts of the face may be distinguished, the shape of the body is clearly marked out, the haunches and the abdomen are elevated, the fingers and toes are separated from each other, and the intestines appear like minute threads.

At

(s) The rudiments of the child are usually distinguished by this name till the human figure can be distinctly ascertained, and then it has the appellation of *fœtus*.

Of the
Abdomen.

At the end of the third month, the fœtus measures about three inches; at the end of the fourth month, five inches; in the fifth month, six or seven inches; in the sixth month, eight or nine inches; in the seventh month, eleven or twelve inches; in the eighth month, fourteen or fifteen inches; and at the end of the ninth month, or full time, from eighteen to twenty-two inches. But as we have not an opportunity of examining the same fœtus at different periods of pregnancy, and as their size and length may be influenced by the constitution and mode of life of the mother, calculations of this kind must be very uncertain.

The fœtus during all this time assumes an oval figure, which corresponds with the shape of the uterus. Its chin is found reclining on its breast with its knees drawn up towards its chin, and its arms folded over them. But it seems likely, that the posture of some of these parts is varied in the latter months of pregnancy, so as to cause those painful twitches which its mother usually feels from time to time. In natural cases, its head is probably placed towards the os tincæ from the time of conception to that of its birth; tho' formerly it was considered as being placed towards the fundus uteri till about the eighth or ninth month, when the head, by becoming specifically heavier than the other parts of the body, was supposed to be turned downwards.

The capacity of the uterus increases in proportion to the growth of the fœtus, but without becoming thinner in its substance, as might naturally be expected. The nourishment of the fœtus, during all this time, seems to be derived from the placenta, which appears to be originally formed by that part of the ovum which is next the fundus uteri. The remaining part of the ovum is covered by a membrane called *spongy chorion* (T); within which is another called *true chorion*, which includes a third termed *amnios* (U): this contains a watery fluid, which is the *liquor amnii* (V), in which the fœtus floats till the time of its birth. On the side next the fœtus, the placenta is covered by the amnios and true chorion; on the side next the mother, it has a production continued from the spongy chorion. The amnios and chorion are remarkably thin and transparent, having no blood-vessels entering into their composition. The spongy chorion is opaque and vascular.

In the first months of pregnancy, the involutera bear a large proportion to their contents; but this proportion is afterwards reversed, as the fœtus increases in bulk.

The placenta, which is the medium through which the blood is conveyed from the mother to the fœtus, and the manner in which this conveyance takes place, deserve next to be considered.

The placenta is a broad, flat, and spongy substance, like a cake, closely adhering to the inner surface of the womb, usually near the fundus, and appearing to be chiefly made up of the ramifications of the umbilical arteries and vein, and partly of the extremities of the uterine vessels. The arteries of the uterus discharge their contents into the substance of this cake; and the veins of the placenta, receiving the blood either by a direct communication of vessels, or by absorption, at length form the umbilical vein, which passes on to the sinus of the vena porta, and from thence to the vena cava, by means of the *canalis venosus*, a communication that is closed in the adult. But the circulation of the blood through the heart is not conducted in the fœtus as in the adult: in the latter, the blood is carried from the right auricle of the heart through the pulmonary artery, and is returned to the left auricle by the pulmonary vein; but a dilatation of the lungs is essential to the passage of the blood through the pulmonary vessels, and this dilatation cannot take place till after the child is born and has respired. This deficiency, however, is supplied in the fœtus by an immediate communication between the right and left auricle, through an oval opening, in the septum which divides the two auricles, called *foramen ovale*. The blood is likewise transmitted from the pulmonary artery to the aorta, by means of a duct called *canalis arteriosus*, which, like the *canalis venosus*, and *foramen ovale*, gradually closes after birth.

The blood is returned again from the fœtus through two arteries called the *umbilical arteries*, which arise from the iliacs. These two vessels taking a winding course with the vein, form with that, and the membranes by which they are surrounded, what is called the *umbilical chord*. These arteries, after ramifying through the substance of the placenta, discharge their blood into the veins of the uterus; in the same manner as the uterine arteries discharged their blood into the branches

(T) Dr Hunter has described this as a lamella from the inner surface of the uterus. In the latter months of pregnancy it becomes gradually thinner and more connected with the chorion: he has named it *membrana caduca*, or *decidua*, as it is cast off with the placenta. Signior Scarpa, with more probability, considers it as being composed of an inspissated coagulable lymph.

(U) In some quadrupeds, the urine appears to be conveyed from the bladder through a canal called *urachus*, to the *allantois*, which is a reservoir, resembling a long and blind gut, situated between the chorion and amnios. The human fœtus seems to have no such reservoir, though some writers have supposed that it does exist. From the top of the bladder a few longitudinal fibres are extended to the umbilical chord; and these fibres have been considered as the *urachus*, though without having been ever found pervious.

(V) The *liquor amnii* coagulates like the lymph. It has been supposed to pass into the œsophagus, and to afford nourishment to the fœtus; but this does not seem probable. Children have come into the world without an œsophagus, or any communication between the stomach and the mouth; but there has been no well attested instance of a child's having been born without a placenta; and it does not seem likely, that any of the fluid can be absorbed through the pores of the skin, the skin in the fœtus being every where covered with a great quantity of mucus.

Of the Abdomen. branches of the umbilical vein. So that the blood is constantly passing in at one side of the placenta and out at the other; but in what particular manner it

gets through the placenta is a point not yet determined.

Of the Abdomen.

EXPLANATION OF PLATES XXV. XXVIII. and XXVI.

PLATE XXV.

FIG. 1. Shows the Contents of the Thorax and Abdomen in situ.

1. Top of the trachea, or wind-pipe. 2 2, The internal jugular veins. 3 3, The subclavian veins. 4, The vena cava descendens. 5, The right auricle of the heart. 6, The right ventricle. 7, Part of the left ventricle. 8, The aorta descendens. 9, The pulmonary artery. 10, The right lung, part of which is cut off to show the great blood-vessels. 11, The left lung entire. 12 12, The anterior edge of the diaphragm. 13 13, The two great lobes of the liver. 14, The ligamentum rotundum. 15, The gall-bladder. 16, The stomach. 17 17, The jejunum and ilium. 18, The spleen.

FIG. 2. Shows the Organs subservient to the Chylopoietic Viscera,—with those of Urine and Generation.

1 1, The under side of the two great lobes of the liver. a, Lobulus Spigelii. 2, The ligamentum rotundum. 3, The gall-bladder. 4, The pancreas. 5, The spleen. 6 6, The kidneys. 7, The aorta descendens. 8, Vena cava ascendens. 9 9, The renal veins covering the arteries. 10, A probe under the spermatic vessels and a bit of the inferior mesenteric artery, and over the ureters. 11 11, The ureters. 12, 12, The iliac arteries and veins. 13, The rectum intestinum. 14, The bladder of urine.

FIG. 3. Shows the Chylopoietic Viscera, and Organs subservient to them, taken out of the body entire.

A A, The under side of the two great lobes of the liver. B, Ligamentum rotundum. C, The gall-bladder. D, Ductus cysticus. E, Ductus hepaticus. F, Ductus communis choledochus. G, Vena portarum. H, Arteria hepatica. I I, The stomach. K K, Venæ & arteriæ gastro-epiploicæ, dextræ & sinistræ. L L, Venæ & arteriæ coronariæ ventriculi. M, The spleen. N N, Mesocolon, with its vessels. O O O, Intestinum colon. P, One of the ligaments of the colon, which is a bundle of longitudinal muscular fibres. Q Q Q Q, Jejunum and ilium. R R, Sigmoid flexure of the colon with the ligament continued, and over S, The rectum intestinum. T T, Levators ani. U, Sphincter ani. V, The place to which the prostate gland is connected. W, The anus.

FIG. 4. Shows the Heart of a Fœtus at the full time, with the Right Auricle cut open to show the Foramen Ovale, or passage between both Auricles.

a, The right ventricle. b, The left ventricle. c c, The outer side of the right auricle stretched out. d d, The posterior side, which forms the anterior side of the septum. e, The foramen ovale, with the membrane or valve which covers the left side. f, Vena ca-

va inferior passing through g, A portion of the diaphragm.

FIG. 5. Shows the Heart and Large Vessels of a Fœtus at the full time.

a, The left ventricle. b, The right ventricle. c, A part of the right auricle. d, Left auricle. e e, The right branch of the pulmonary artery. f, Arteria pulmonalis. g g, The left branch of the pulmonary artery, with a number of its largest branches dissected from the lungs. h, The canalis arteriosus. i, The arch of the aorta. k k, The aorta descendens. l, The left subclavian artery. m, The left carotid artery. n, The right carotid artery. o, The right subclavian artery. p, The origin of the right carotid and right subclavian arteries in one common trunk. q, The vena cava superior or descendens. r, The right common subclavian vein. s, The left common subclavian vein.

N. B. All the parts described in this figure are to be found in the adult, except the canalis arteriosus.

PLATE XXVIII.

FIG. 1. Exhibits the more superficial Lymphatic Vessels of the Lower Extremity.

A, The spine of the os ilium. B, The os pubis. C, The iliac artery. D, The knee. E, E, F, Branches of the crural artery. G, The musculus gastrocnemius. H, The tibia. I, The tendon of the musculus tibialis anticus. On the out-lines, a, A lymphatic vessel belonging to the top of the foot. b, Its first division into branches. c, c, c, Other divisions of the same lymphatic vessel. d, A small lymphatic gland. e, The lymphatic vessels which lie between the skin and the muscles of the thigh. f, f, Two lymphatic glands at the upper part of the thigh below the groin. g g, Other glands. h, A lymphatic vessel which passes by the side of those glands without communicating with them; and, bending towards the inside of the groin at (i), opens into the lymphatic gland (k). l, l, Lymphatic glands in the groin, which are common to the lymphatic vessels of the genitals and those of the lower extremity. m, n, A plexus of lymphatic vessels passing on the inside of the iliac artery.

FIG. 2. Exhibits a back View of the Lower Extremity, dissected so as to show the deeper-seated Lymphatic Vessels which accompany the Arteries.

A, The os pubis. B, The tuberosity of the ischium. C, That part of the os ilium which was articulated with the os sacrum. D, The extremity of the iliac artery appearing above the groin. E, The knee. F, F, The two cut surfaces of the triceps muscle, which was divided to show the lymphatic vessels that pass through its perforation along with the crural artery. G, The edge of the musculus gracilis. H, The gastrocnemius and soleus, much shrunk by being dried, and by the soleus being separated from the

Of the
Abdomen.

the tibia to expose the vessels. I, The heel. K, The sole of the foot. L, The superficial lymphatic vessels passing over the knee, to get to the thigh. On the out-lines; M, The posterior tibial artery. a, A lymphatic vessel accompanying the posterior tibial artery. b, The same vessel crossing the artery. c, A small lymphatic gland, thro' which this deep-seated lymphatic vessel passes. d, The lymphatic vessel passing under a small part of the soleus, which is left attached to the bone, the rest being removed. e, The lymphatic vessel crossing the popliteal artery. f, g, h, Lymphatic glands in the ham, through which the lymphatic vessel passes. i, The lymphatic vessel passing with the crural artery, through the perforation of the triceps muscle. k, The lymphatic vessel, after it has passed the perforation of the triceps, dividing into branches which embrace the artery (l). m, A lymphatic gland belonging to the deep-seated lymphatic vessel. At this place those vessels pass to the fore part of the groin, where they communicate with the superficial lymphatic vessels. n, A part of the superficial lymphatic vessel appearing on the brim of the pelvis.

FIG. 3. Exhibits the Trunk of the Human Subject, prepared to show the Lymphatic Vessels and the Ductus Thoracicus.

A, The neck. BB, The two jugular veins. C, The vena cava superior. D D D D, The subclavian veins. E, The beginning of the aorta, pulled to the left side by means of a ligature, in order to show the thoracic duct behind it. F, The branches arising from the curvature of the aorta. G G, The two carotid arteries. H H, The first ribs. I I, The trachea. K K, The spine. L L, The vena azygos. M M, The descending aorta. N, The coeliac artery, dividing into three branches. O, The superior mesenteric artery. P, The right crus diaphragmatis. Q Q, The two kidneys. R, The right emulgent artery. S S, The external iliac arteries. g d, The musculi psoæ. T, The internal iliac artery. U, The cavity of the pelvis. X X, The spine of the os ilium. Y Y, The groins. a, A lymphatic gland in the groin, into which lymphatic vessels from the lower extremity are seen to enter. b b, The lymphatic vessels of the lower extremities passing under Poupart's ligament. c c, A plexus of the lymphatic vessels lying on each side of the pelvis. d, The psoas muscle with lymphatic vessels lying upon its inside. e, A plexus of lymphatics, which having passed over the brim of the pelvis at (c), having entered the cavity of the pelvis, and received the lymphatic vessels belonging to the viscera contained in that cavity, next ascends, and passes behind the iliac artery to (g). f, Some lymphatic vessels of the left side passing over the upper part of the os sacrum, to meet those of the right side. g, The right psoas, with a large plexus of lymphatics lying on its inside. h h, The plexus lying on each side of the spine. i i i, Spaces occupied by the lymphatic glands. k, The trunk of the lacteals, lying on the under side of the superior mesenteric artery. l, The same dividing into two branches, one of which passes on each side of the aorta; that of the right side being seen to enter the thoracic duct at (m). m, The thoracic duct beginning from the large lymphatics. n, The duct passing under the lower part of the crus diaphragmatis,

N° 19.

and under the right emulgent artery. o, The thoracic duct penetrating the thorax. p, Some lymphatic vessels joining that duct in the thorax. q, The thoracic duct passing under the curvature of the aorta to get to the left subclavian vein. The aorta being drawn aside to show the duct. r, A plexus of lymphatic vessels passing upon the trachea from the thyroide gland to the thoracic duct.

PLATE XXVI.

FIG. 1. Represents the Under and Posterior Side of the Bladder of Urine, &c.

a, The bladder. b b, The insertion of the ureters. c c, The vasa deferentia, which convey the semen from the testicles to d d, The vesiculæ seminales,—and pass through e, The prostate gland, to discharge themselves into f, The beginning of the urethra.

FIG. 2. A Transverse Section of the Penis.

g g, Corpora cavernosa penis. h, Corpus cavernosum urethrae. i, Urethra. k, Septum penis. ll, The septum between the corpus cavernosum urethrae and that of the penis.

FIG. 3. A Longitudinal Section of the Penis.

m m, The corpora cavernosa penis, divided by o, The septum penis. n, The corpus cavernosum glandis, which is the continuation of that of the urethra.

FIG. 4. Represents the Female Organs of Generation.

a, That side of the uterus which is next the os sacrum. 1, Its fundus. 2, Its cervix. b b, The Fallopian or uterine tubes, which open into the cavity of the uterus;—but the other end is open within the pelvis, and surrounded by c c, The fimbriæ. d d, The ovaria. e, The os internum uteri, or mouth of the womb. f f, The ligamenta rotunda, which passes without the belly, and is fixed to the labia pudendi. g g, The cut edges of the ligamenta lata, which connects the uterus to the pelvis. h, The inside of the vagina. i, The orifice of the urethra. k, The clitoris surrounded by (l) The præputium. m m, The labia pudendi. n n, The nymphæ.

FIG. 5. Shows the Spermatic Ducts of the Testicle filled with Mercury.

A, The vas deferens. B, Its beginning, which forms the posterior part of the epididymis. C, The middle of the epididymis, composed of serpentine ducts. D, The head or anterior part of the epididymis unravelled. e e e e, The whole ducts which compose the head of the epididymis unravelled. f f, The vasa deferentia. g g, Rete testis. h h, Some rectilinear ducts which send off the vasa deferentia. i i, The substance of the testicle.

FIG. 6. The Right Testicle entire, and the Epididymis filled with Mercury.

A, The beginning of the vas deferens. B, The vas deferens ascending towards the abdomen. C, The posterior part of the epididymis, named *globus minor*. D, The spermatic vessels inclosed in cellular substance. E, The body of the epididymis. F, Its head, named *globus major*. G, Its beginning from the testicle. H, The body of the testicle, inclosed in the tunica albuginea.

PART

Fig. 1.

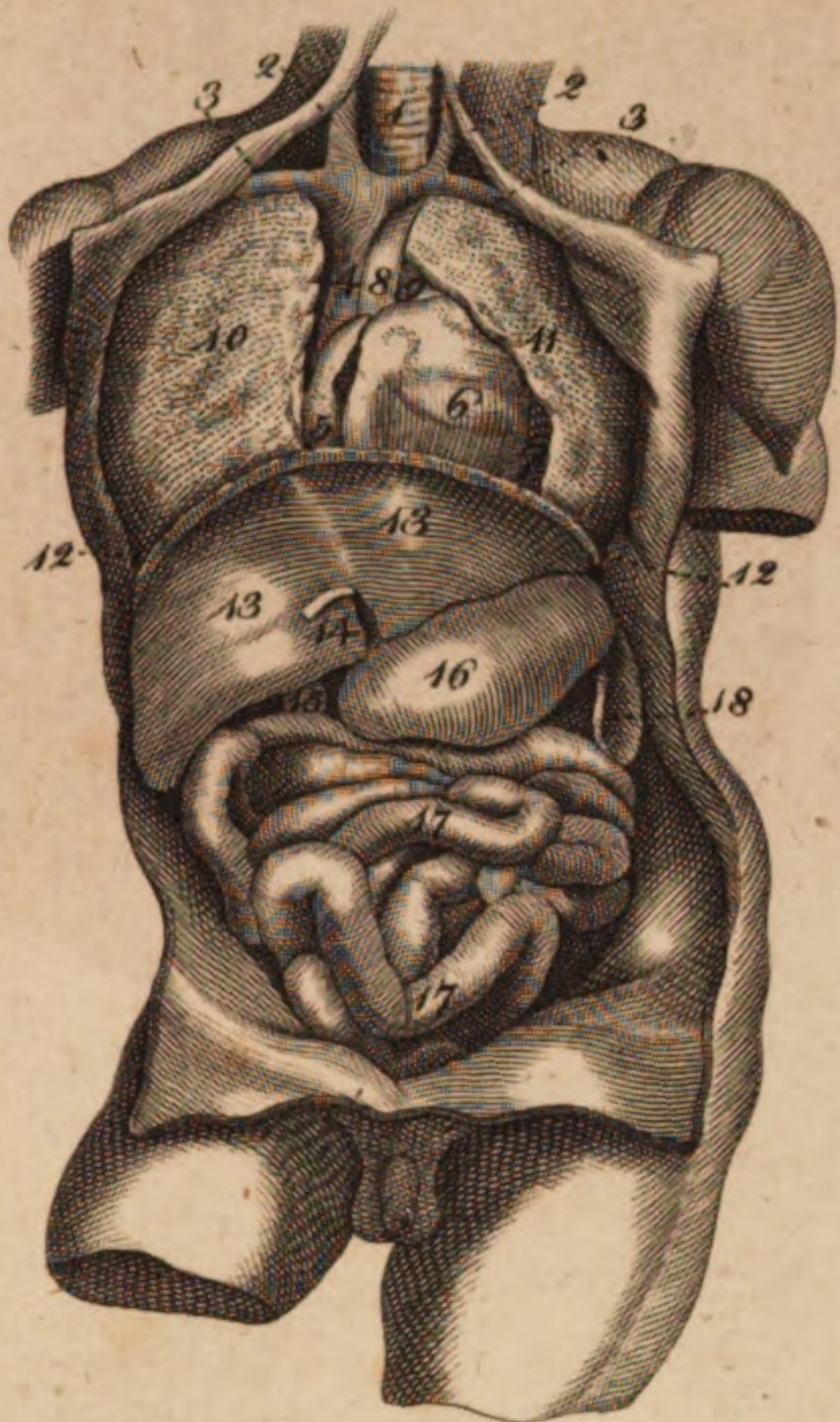


Fig. 2.

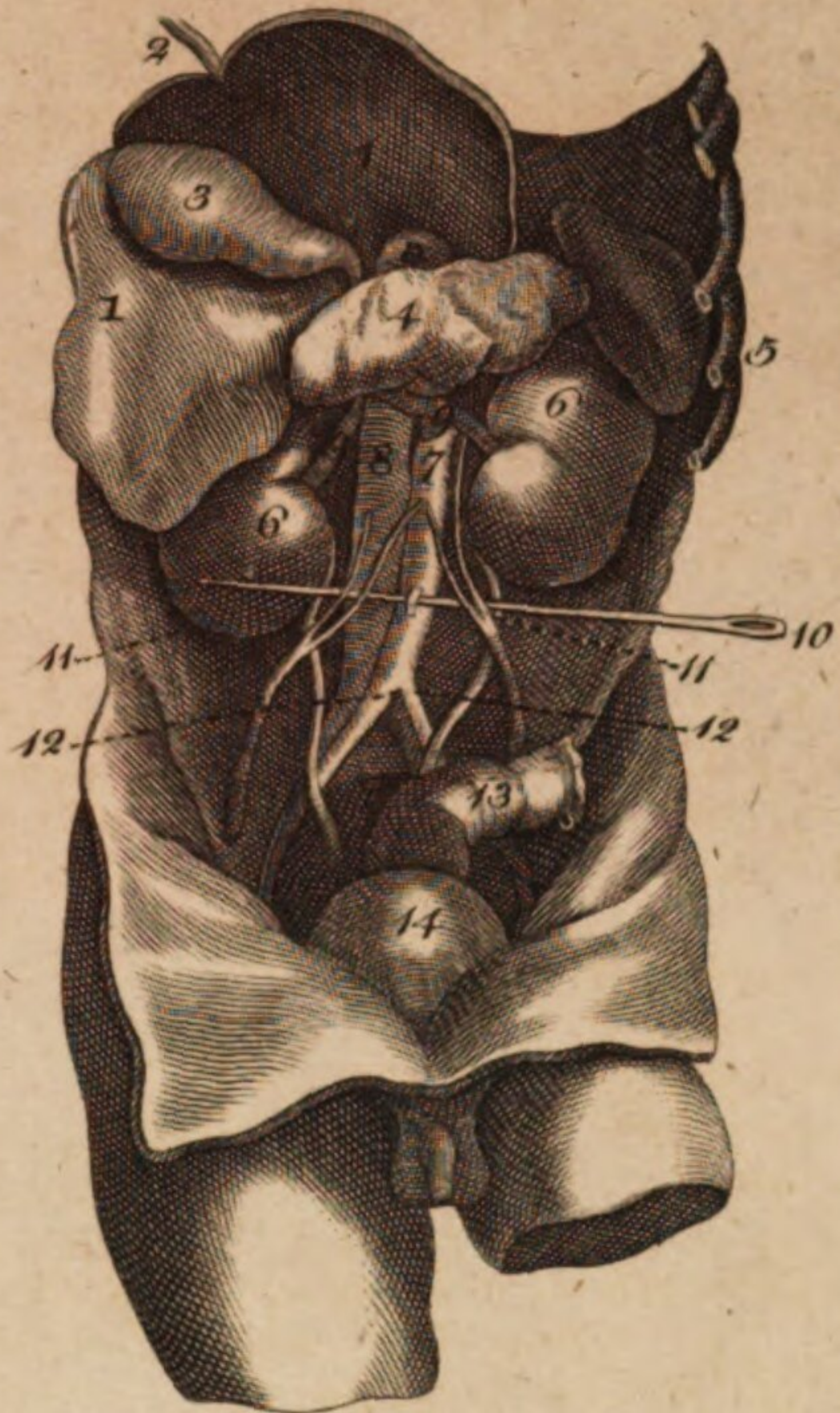


Fig. 3.



Fig. 4.

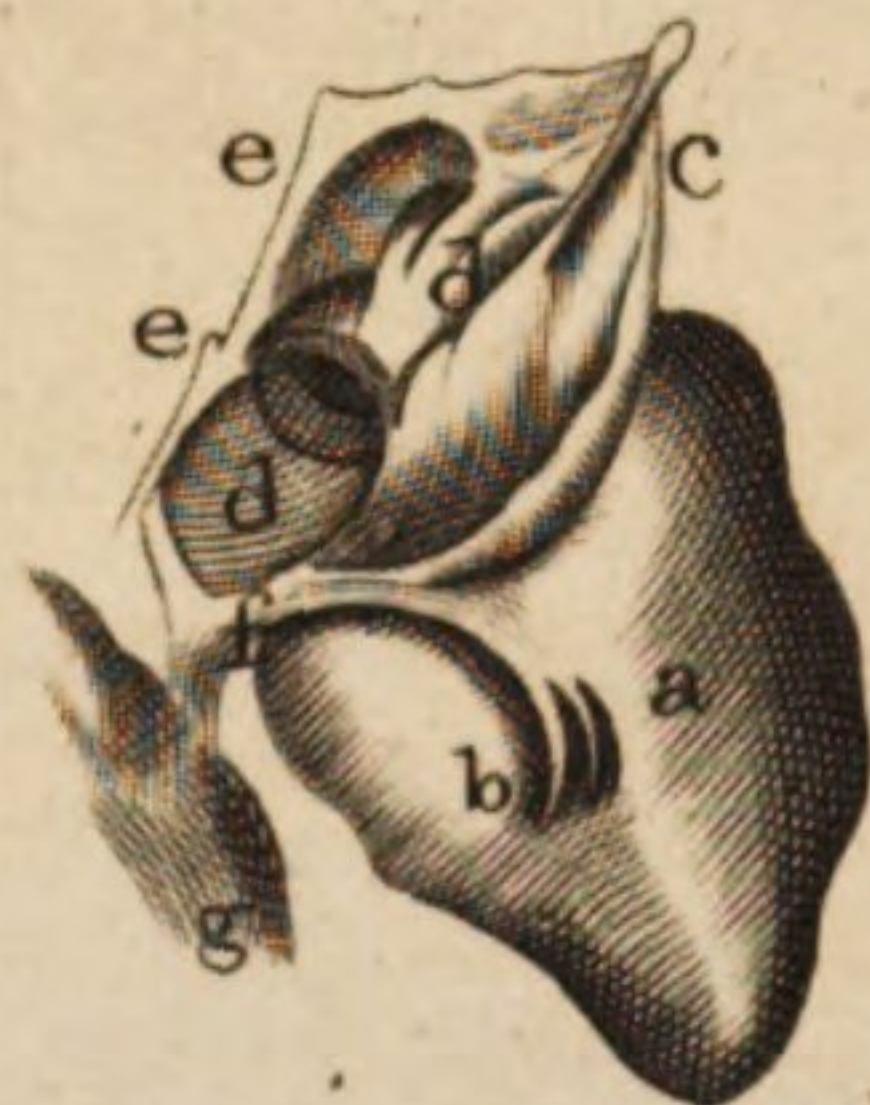
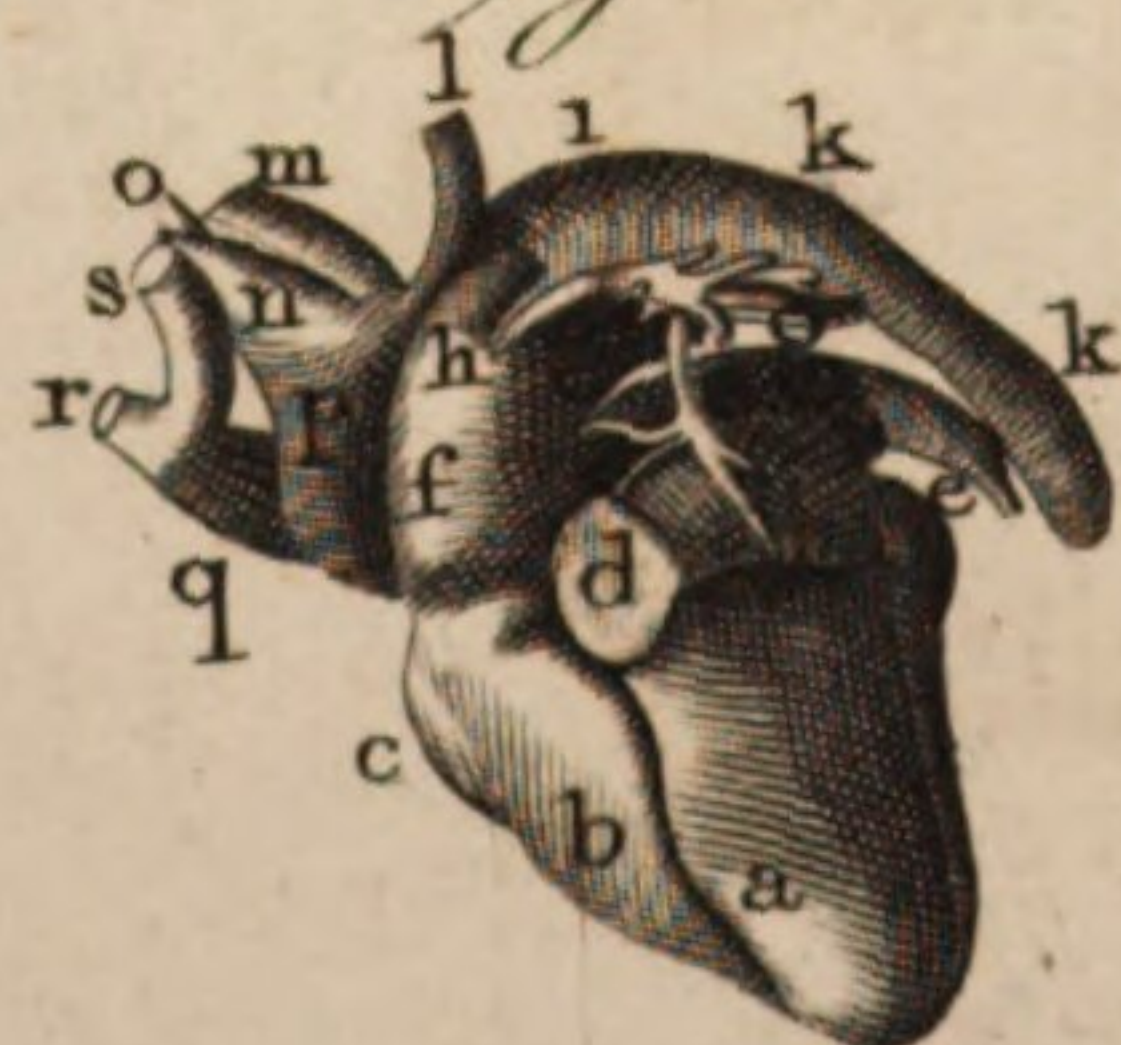


Fig. 5.



A. Bell Pin. Wal. sculptor fecit.

Fig. 1.

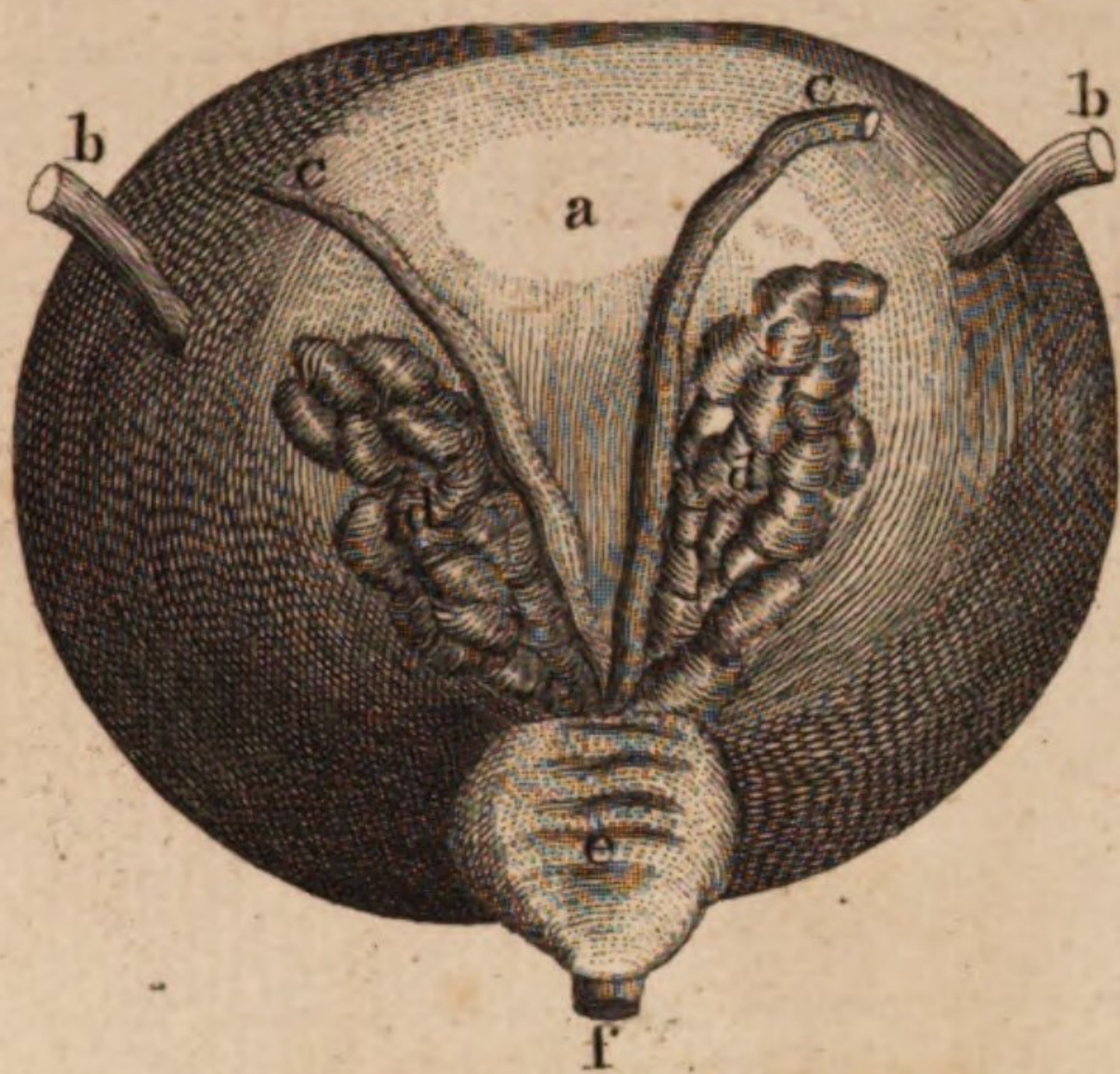


Fig. 4.

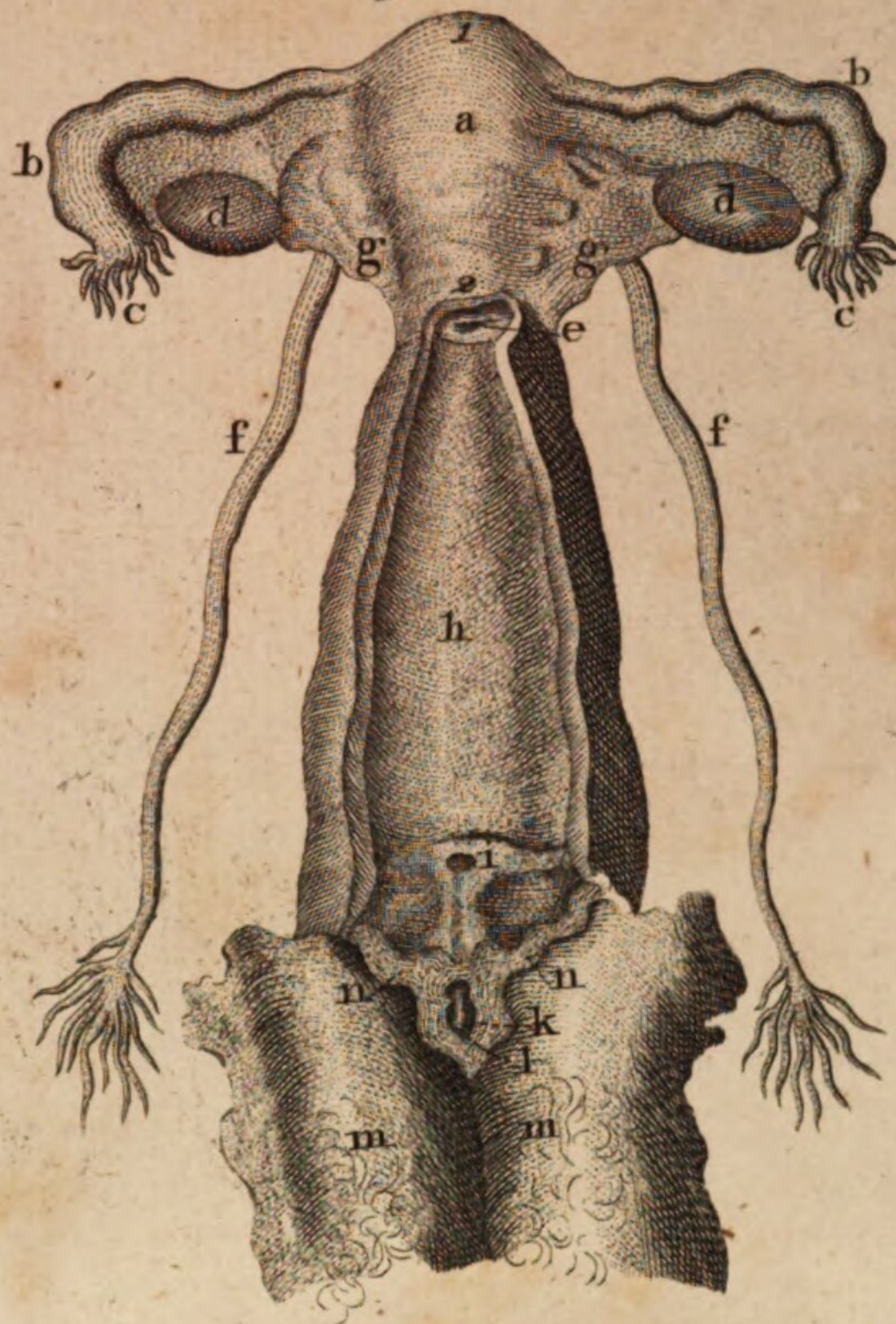


Fig. 2.



Fig. 5.



Fig. 6.

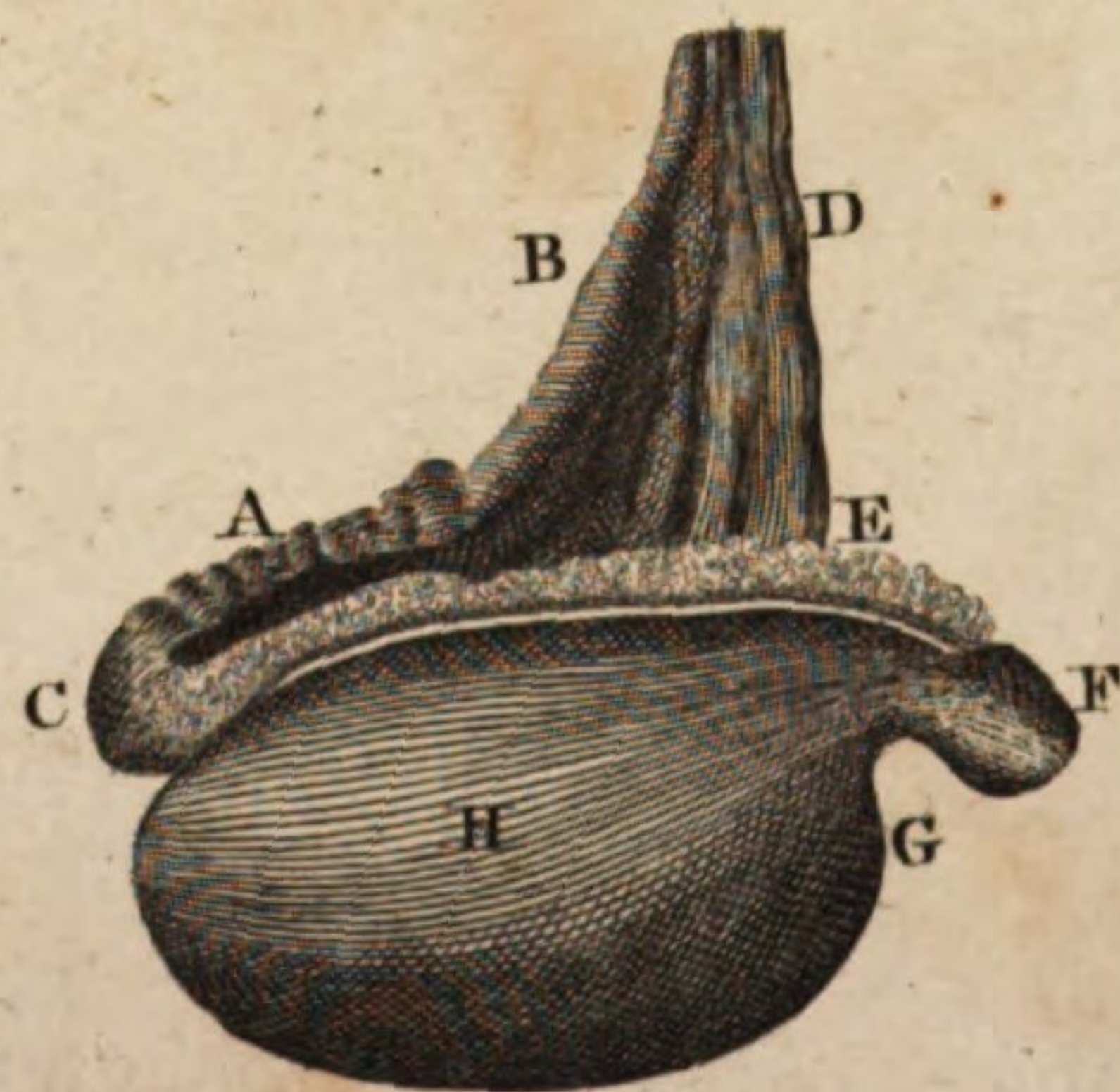


Fig. 3.



M. Bell Pin. Wal. Sculptor fecit.

1872

1872



Fig. 3.



Fig. 1.



Fig. 6.



Fig. 2.



Fig. 4.



Fig. 5.

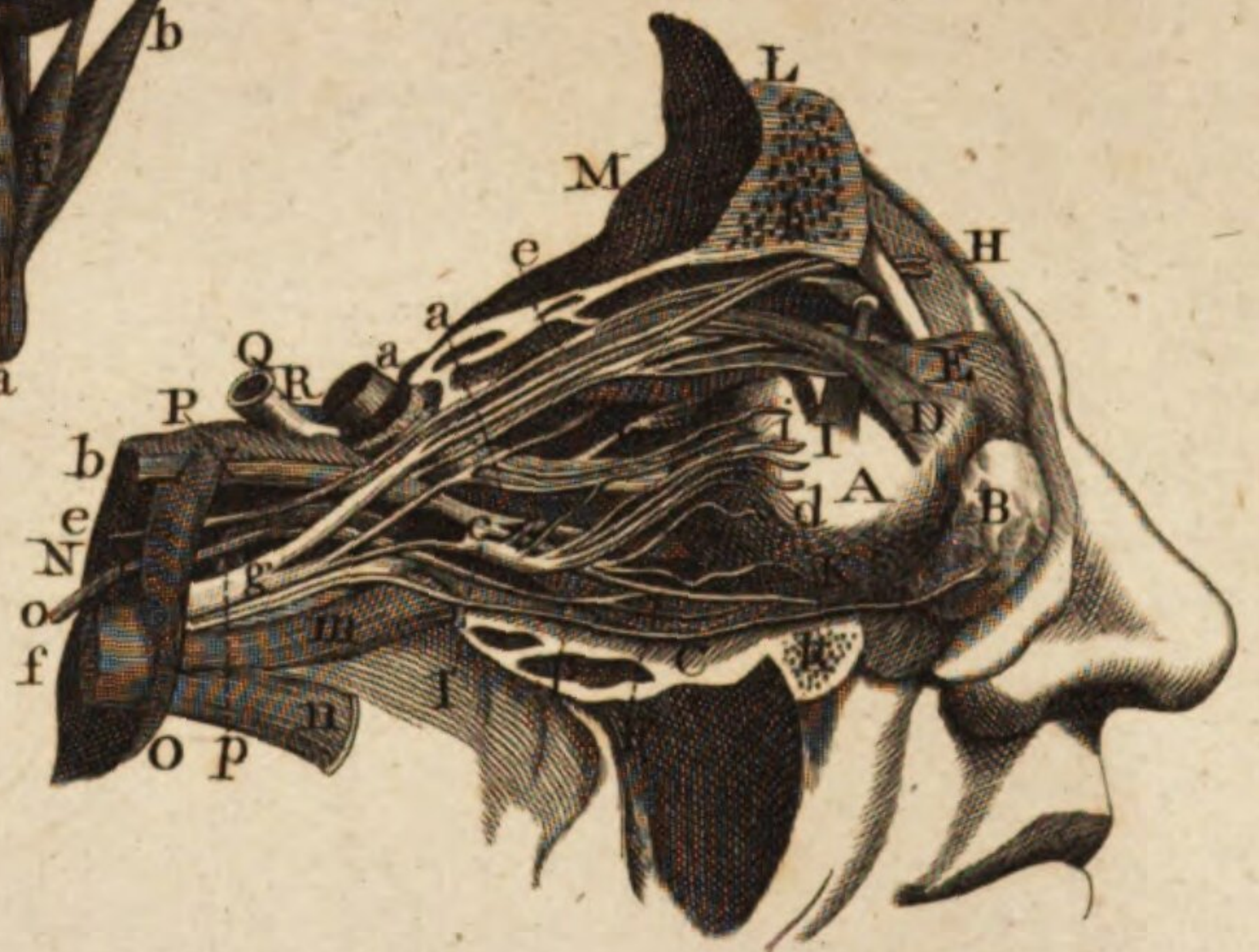


Fig. 7.



Fig. 10.



Fig. 9.



Fig. 8.



A. Bell. Prin. Wal. Sculptor fecit.

1072-1071

1071-1072

Pa
C
T

o
cl

PART IV. OF THE THORAX.

III
Of the
chest.

THE THORAX, or CHEST, is that cavity of the trunk which extends from the clavicles, or the lower part of the neck, to the diaphragm, and includes the vital organs, which are the heart and lungs; and likewise the trachea and œsophagus.—This cavity is formed by the ribs and vertebræ of the back, covered by a great number of muscles, and by the common integuments, and anteriorly by two glandular bodies called the *breasts*. The spaces between the ribs are filled up by muscular fibres, which from their situation are called *intercostal muscles*.

SECT. I. Of the Breasts.

III

THE *breasts* may be defined to be two large conglomerate glands, mixed with a good deal of adipose membrane. The glandular part is composed of an infinite number of minute arteries, veins, and nerves.

The arteries are derived from two different trunks; one of which is called the *internal*, and the other the *external, mammary artery*. The first of these arises from the subclavian, and the latter from the axillary.

The veins every where accompany the arteries, and are distinguished by the same name. The nerves are chiefly from the vertebral pairs. Like all other conglomerate glands, the breasts are made up of a great many small distinct glands, in which the milk is secreted from the ultimate branches of arteries. The excretory ducts of these several glands, gradually uniting as they approach the nipple, form the tubuli lactiferi, which are usually more than a dozen in number, and open at its apex, but have little or no communication, as has been supposed, at the root of the nipple. These ducts, in their course from the glands, are surrounded by a ligamentary elastic substance, which terminates with them in the nipple. Both this substance, and the ducts which it contains, are capable of considerable extension and contraction; but in their natural state are moderately corrugated, so as to prevent an involuntary flow of milk, unless the distending force be very great from the accumulation of too great a quantity.

The whole substance of the nipple is very spongy and elastic: its external surface is uneven, and full of small tubercles. The nipple is surrounded with a disk or circle of a different colour, called the *areola*; and on the inside of the skin, under the areola, are many sebaceous glands, which pour out a mucus to defend the areola and nipple: for the skin upon these parts is very thin; and the nervous papillæ lying very bare, are much exposed to irritation.

The breasts are formed for the secretion of milk, which is destined for the nourishment of the child for some time after its birth. This secretion begins to take place soon after delivery, and continues to flow for

Vol. I. Part II.

many months in very large quantities, if the woman suckles her child.

The operation of suction depends on the principles of the air-pump, and the flow of milk through the lactiferous tubes is facilitated by their being stretched out.

The milk, examined chemically, appears to be composed of oil, mucilage, and water, and of a considerable quantity of sugar. The generality of physiologists have supposed that, like the chyle, it frequently retains the properties of the aliment and medicines taken into the stomach; but from some late experiments*, this supposition appears to be ill founded.

* Journ. de
Med. 1781.

SECT. II. Of the Pleura.

THE cavity of the thorax is every where lined by a membrane of a firm texture called *pleura*. It is composed of two distinct portions or bags, which, by being applied to each other laterally, form a septum called *mediastinum*; which divides the cavity into two parts, and is attached posteriorly to the vertebræ of the back, and anteriorly to the sternum. But the two laminae of which this septum is formed, do not every where adhere to each other; for at the lower part of the thorax they are separated, to afford a lodgment to the heart: and at the upper part of the cavity, they receive between them the thymus.

The pleura is plentifully supplied with arteries and veins from the internal mammary and the intercostals. Its nerves, which are very inconsiderable, are derived chiefly from the dorsal and intercostal nerves.

The surface of the pleura, like that of the peritonæum and other membranes lining cavities, is constantly bedewed with a serous moisture (w), which prevents adhesions of the viscera.

The mediastinum, by dividing the breast into two cavities, obviates many inconveniences, to which we should otherwise be liable. It prevents the two lobes of the lungs from compressing each other when we lie on one side; and consequently contributes to the freedom of respiration, which is disturbed by the least pressure on the lungs. If the point of a sword penetrates between the ribs into the cavity of the thorax, the lungs on that side cease to perform their office; because the air being admitted through the wound, prevents the dilatation of that lobe; while the other lobe, which is separated from it by the mediastinum, remains unhurt, and continues to perform its function as usual.

SECT. II. Of the Thymus.

THE *thymus* is a glandular substance, the use of which is not perfectly ascertained, its excretory duct not having yet been discovered. It is of an oblong figure,

(w) When this fluid is exhaled in too great a quantity, or is not properly carried off, it accumulates and constitutes the hydrops pectoris.

Of the
Thorax.

figure, and is larger in the fœtus and in young children than in adults, being sometimes nearly effaced in very old subjects. It is placed in the upper part of the thorax, between the two laminae of the mediastinum; but at first is not altogether contained within the cavity of the chest, being found to border upon the upper extremity of the sternum.

SECT. IV. *Of the Diaphragm.*

115

THE cavity of the thorax is separated from that of the abdomen, by a fleshy and membranous septum called the *diaphragm* or *midriff*. The greatest part of it is composed of muscular fibres; and on this account systematic writers usually place it very properly among the muscles. Its middle part is tendinous, and it is covered by the pleura above, and by the peritonæum below. It seems to have been improperly named *septum transversum*, as it does not make a plane transverse division of the two cavities, but forms a kind of vault, the fore part of which is attached to the sternum. Laterally it is fixed to the last of the true ribs, and to all the false ribs; and its lower and posterior part is attached to the vertebræ lumborum, where it may be said to be divided into two portions or crura (x).

The principal arteries of the diaphragm are derived from the aorta, and its veins pass into the vena cava. Its nerves are chiefly derived from the cervical pairs. It affords a passage to the vena cava through its tendinous part, and to the œsophagus through its fleshy portion. The aorta passes down behind it between its crura.

The diaphragm not only serves to divide the thorax from the abdomen, but by its muscular structure is rendered one of the chief agents in respiration. When its fibres contract, its convex side, which is turned towards the thorax, becomes gradually flat, and by increasing the cavity of the breast, affords room for a complete dilatation of the lungs, by means of the air which is then drawn into them by the act of inspiration. The fibres of the diaphragm then relax; and as it resumes its former state, the cavity of the thorax becomes gradually diminished, and the air is driven out again from the lungs by a motion contrary to the former one, called *expiration*.

It is in some measure, by means of the diaphragm, that we void the feces at the anus, and empty the urinary bladder. Besides these offices, the acts of coughing, sneezing, speaking, laughing, gaping, and sighing, could not take place without its assistance; and the gentle pressure which all the abdominal viscera receive from its constant and regular motion, cannot fail to assist in the performance of the several functions which were ascribed to those viscera.

SECT. V. *Of the Trachea.*Of the
Thorax.

116

THE trachea, or windpipe, is a cartilaginous and membranous canal, through which the air passes into the lungs. Its upper part, which is called the *larynx*, is composed of five cartilages. The uppermost of these cartilages is placed over the glottis or mouth of the larynx, and is called *epiglottis*, which has been before spoken of, as closing the passage to the lungs in the act of swallowing. At the sides of the glottis are placed the two arytenoide cartilages, which are of a very complex figure, not easy to be described. The anterior and larger part of the larynx is made up of two cartilages; one of which is called *thyroides* or *scutiformis*, from its being shaped like a buckler; and the other *cricoides* or *annularis*, from its resembling a ring. Both these cartilages may be felt immediately under the skin; at the fore part of the throat, and the thyroides, by its convexity, forms an eminence called *prominens adamii*, which is usually more considerable in the male than in the female subject.

All these cartilages are united to each other by means of very elastic, ligamentous fibres; and are enabled, by the assistance of their several muscles, to dilate or contract the passage of the larynx, and to perform that variety of motion which seems to point out the larynx as the principal organ of the voice; for when the air passes out through a wound in the trachea, it produces no sound.

These cartilages are moistened by a mucus, which seems to be secreted by minute glands situated near them. The upper part of the trachea is covered anteriorly and laterally by a considerable body, which is supposed to be of a glandular structure, and from its situation near the thyroid cartilage is called the *thyroid gland*; though its excretory duct has not yet been discovered, or its real use ascertained.

The glottis is interiorly covered by a very fine membrane, which is moistened by a constant supply of a watery fluid. From the larynx, the canal begins to take the name of *trachea* or *aspera arteria*, and extends from thence as far down as the third or fourth vertebra of the back, where it divides into two branches, which are the right and left bronchial tube. Each of these bronchi (y) ramifies through the substance of that lobe of the lungs, to which it is distributed, by an infinite number of branches, which are formed of cartilages separated from each other like those of the trachea, by an intervening membranous and ligamentary substance. Each of these cartilages is of an angular figure; and as they become gradually less and less in their diameter, the lower ones are in some measure received into those above them, when the lungs, after being inflated, gradually collapse by the air being pushed

(x) Anatomical writers have usually described the diaphragm as being made up of two muscles united by a middle tendon; and these two portions or crura form what they speak of as the *inferior muscle*, arising from the sides and fore part of the vertebræ.

(y) The right bronchial tube is usually found to be somewhat shorter and thicker than the left; and M. Portal, who has published a memoir on the action of the lungs on the aorta in respiration, observes, that the left bronchial tube is closely contracted by the aorta; and from some experiments he is induced to conclude, that in the first respirations, the air only enters into the right lobe of the lungs. *Memoires de l'Academie Royale des Sciences*, 1769.

Of the
Thorax.

ed out from them in expiration. As the branches of the bronchi become more minute, their cartilages become more and more angular and membranous, till at length they are found to be perfectly membranous, and at last become invisible.

The trachea is furnished with fleshy or muscular fibres; some of which pass through its whole extent longitudinally, while the others are carried round it in a circular direction; so that by the contraction or relaxation of these fibres, it is enabled to shorten or lengthen itself, and likewise to dilate or contract the diameter of its passage.

The trachea and its branches, in all their ramifications, are furnished with a great number of small glands which are lodged in their cellular substance, and discharge a mucous fluid on the inner surface of these tubes.

The cartilages of the trachea, by keeping it constantly open, afford a free passage to the air, which we are obliged to be incessantly respiring; and its membranous part, by being capable of contraction and dilatation, enables us to receive and expel the air in a greater or less quantity, and with more or less velocity, as may be required in singing or in declamation. This membranous structure of the trachea posteriorly, seems likewise to assist in the descent of the food, by preventing that impediment to its passage down the œsophagus, which might be expected if the cartilages were complete rings.

The trachea receives its arteries from the carotid and subclavian arteries, and its veins pass into the jugulars. Its nerves arise from the recurrent branch of the eighth pair, and from the cervical plexus.

SECT. VI. *Of the Lungs.*

117

THE lungs fill the greater part of the cavity of the breast. They are of a soft and spongy texture, and are divided into two lobes, which are separated from each other by the mediastinum, and are externally covered by a production of the pleura. Each of these is divided into two or three lesser lobes; and we commonly find three in the right side of the cavity, and two in the left.

To discover the structure of the lungs, it is required to follow the ramifications of the bronchi, which were described in the last section. These becoming gradually more and more minute, at length terminate in the cellular spaces or vesicles, which make up the greatest part of the substance of the lungs, and readily communicate with each other.

The lungs seem to possess but little sensibility. Their nerves, which are small, and few in number, are derived from the intercostal and eighth pair. This last pair having reached the thorax, sends off a branch on each side of the trachea, called the *recurrent*, which reascends at the back of the trachea, to which it furnishes branches in its ascent, as well as to the œsophagus, but it is chiefly distributed to the larynx and its muscles. By dividing the recurrent and superior laryngeal nerves at their origin, an animal is deprived of its voice.

There are two series of arteries which carry blood to the lungs: these are the *artēriæ bronchiales*, and the pulmonary artery.

The *artēriæ bronchiales* begin usually by two branch-

es; one of which commonly arises from the right intercostal, and the other from the trunk of the aorta: but sometimes there are three of these arteries, and in some subjects only one. The use of these arteries is to serve for the nourishment of the lungs, and their ramifications are seen creeping every where on the branches of the bronchi. The blood is brought back from them by the bronchial vein into the vena azygos.

The pulmonary artery and vein are not intended for the nourishment of the lungs; but the blood in its passage through them is destined to undergo some changes, or to acquire certain essential properties (from the action of the air), which it has lost in its circulation through the other parts of the body. The pulmonary artery receives the blood from the right ventricle of the heart, and dividing into two branches, accompanies the bronchi every where, by its ramifications through the lungs; and the blood is afterwards conveyed back by the pulmonary vein, which gradually forming a considerable trunk, goes to empty itself into the left ventricle of the heart; so that the quantity of blood which enters into the lungs, is perhaps greater than that which is sent in the same proportion of time through all the other parts of the body.

SECT. VII. *Of Respiration.*Of the
Thorax.

RESPIRATION constitutes one of those functions which are properly termed *vital*, as being essential to life; for to live and to breathe are in fact synonymous terms. It consists in an alternate contraction and dilatation of the thorax, by first inspiring air into the lungs, and then expelling it from them in expiration.

It will perhaps be easy to distinguish and point out the several phenomena of respiration; but to explain their physical cause will be attended with difficulty: for it will naturally be enquired, how the lungs, when emptied of the air, and contracted by expiration, become again inflated, they themselves being perfectly passive? How the ribs are elevated in opposition to their own natural situation? and why the diaphragm is contracted downwards towards the abdomen? Were we to assert that the air, by forcing its way into the cavity of the lungs, dilated them, and consequently elevated the ribs, and pressed down the diaphragm, we should speak erroneously. What induces the first inspiration, it is not easy to ascertain; but after an animal has once respired, it would seem likely that the blood, after expiration, finding its passage through the lungs obstructed, becomes a stimulus, which induces the intercostal muscles and the diaphragm to contract, and enlarge the cavity of the thorax, in consequence perhaps of a certain nervous influence, which we will not here attempt to explain. The air then rushes into the lungs; every branch of the bronchial tubes, and all the cellular spaces into which they open, become fully dilated; and the pulmonary vessels being equally distended, the blood flows through them with ease. But as the stimulus which first occasioned this dilatation ceases to operate, the muscles gradually contract, the diaphragm rises upwards again, and diminishes the cavity of the chest; the ribs return to their former state; and as the air passes out in expiration, the lungs gradually collapse, and a resistance to the passage of the blood again takes place. But the heart continuing to receive and expel the

118

Of the
Thorax

blood, the pulmonary artery begins again to be distended, the stimulus is renewed, and the same process is repeated, and continues to be repeated, in a regular succession during life: for though the muscles of respiration, having a mixed motion, are (unlike the heart) in some measure dependent on the will, yet no human being, after having once respired, can live many moments without it. In an attempt to hold one's breath, the blood soon begins to distend the veins, which are unable to empty their contents into the heart; and we are able only, during a very little time, to resist the stimulus to inspiration. In drowning, the circulation seems to be stopped upon this principle; and in hanging, the pressure made on the jugular veins may co-operate with the stoppage of respiration in bringing on death.

Till within these few years physiologists were entirely ignorant of the use of respiration. It was at length discovered in part by the illustrious Dr Priestly. He found that the air expired by animals was phlogisticated; and that the air was fitter for respiration, or for supporting animal life, in proportion as it was freer from the phlogistic principle. It had long been observed, that the blood in passing through the lungs acquired a more florid colour. He therefore suspected, that it was owing to its having imparted phlogiston to the air: and he satisfied himself of the truth of this idea by experiments, which showed, that the crassamentum of extravasated blood, phlogisticated air in proportion as it lost its dark colour. He farther found, that blood thus reddened had a strong attraction for phlogiston; inasmuch that it was capable of taking it from phlogisticated air, thereby becoming of a darker colour. From hence it appeared that the blood, in its circulation through the arterial system, imbibes a considerable quantity of phlogiston, which is discharged from it to the air in the lungs.

This discovery has since been prosecuted by two very ingenious physiologists, Dr Crawford and Mr Elliot. It had been shown by professors Black and Irvine, that different bodies have different capacities for containing fire. For example, that oil and water, when equally hot to the sense and the thermometer, contain different proportions of that principle; and that unequal quantities of it are required, in order to raise those substances to like temperatures. The enquiries of Dr Crawford and Mr Elliot tend to prove, that the capacities of bodies for containing fire are diminished by the addition of phlogiston, and increased by its separation: the capacity of calx of anatomy, for example, being greater than that of the anatomy itself. Common air contains a great quantity of fire; combustible bodies very little. In combustion, a double elective attraction takes place; the phlogiston of the body being transferred to the air, the fire contained in the air to the combustible body. But as the capacity of the latter is not increased so much as that of the former is diminished, only part of the extricated fire will be absorbed by the body. The remainder therefore will raise the temperature of the compound; and hence we may account for the heat attending combustion. As the

use of respiration is to dephlogisticate the blood, it seems probable, that a like double elective attraction takes place in this process; the phlogiston of the blood being transferred to the air, and the fire contained in the air to the blood; but with this difference, that the capacities being equal, the whole of the extricated fire is absorbed by the latter. The blood in this state circulating through the body, imbibes phlogiston, and of course gives out its fire; part only of which is absorbed by the parts furnishing the phlogiston, the remainder, as in combustion, becoming sensible; and is therefore the cause of the heat of the body, or what is called animal heat.

In confirmation of this doctrine it may be observed, that the venous blood contains less fire than the arterial; combustible bodies less than incombustible ones; and that air contains less of this principle, according as it is rendered, by combination with phlogiston, less fit for respiration (z).

In ascending very high mountains, respiration is found to become short and frequent, and sometimes to be attended with a spitting of blood. These symptoms seem to be occasioned by the air being too rare and thin to dilate the lungs sufficiently; and the blood gradually accumulating in the pulmonary vessels, sometimes bursts through their coats, and is brought up by coughing. This has likewise been accounted for in a different way, by supposing that the air contained in the blood, not receiving an equal pressure from that of the atmosphere, expands, and at length ruptures the very minute branches of the pulmonary vessels; upon the same principle that fruits and animals put under the receiver of an air-pump, are seen to swell as the outer air becomes exhausted. But Dr Darwin of Litchfield has lately published some experiments, which seem to prove, that no air or elastic vapour does exist in the blood-vessels, as has been generally supposed; and he is induced to impute the spitting of blood which has sometimes taken place in ascending high mountains, to accident, or to violent exertions; as it never happens to animals that are put into the exhausted receiver of an air-pump, where the diminution of pressure is many times greater than on the summit of the highest mountains.

SECT. VIII. *Of the Voice.*

RESPIRATION has already been described as affording us many advantages; and next to that of life, its most important use seems to be that of forming the voice and speech. The ancients, and almost all the moderns, have considered the organ of speech as a kind of musical instrument, which may be compared to a flute, to an hautboy, to an organ, &c. and they argue after the following manner.

The trachea, which begins at the root of the tongue, and goes to terminate in the lungs, may be compared to the pipe of an organ, the lungs dilating like bellows during the time of inspiration; and as the air is driven out from them in expiration, it finds its passage straitened by the cartilages of the larynx, against which it strikes.

(z) See Crawford's Experiments and Observations on Animal Heat, and Elliot's Philosophical Observations.

^{Of the Thorax.} strikes. As these cartilages are more or less elastic, they occasion in their turn more or less vibration in the air, and thus produce the sound of the voice; the variation in the sound and tone of which depends on the state of the glottis, which, when straitened, produces an acute tone, and a grave one when dilated.

The late M. Ferein communicated to the French Academy of Sciences a very ingenious theory on the formation of the voice. He considered the organ of the voice as a *string*, as well as a *wind*, instrument; so that what art has hitherto been unable to construct, and what both the fathers Merfenne and Kircher so much wished to see, M. Ferein imagined he had at length discovered in the human body. He observes, that there are at the edges of the glottis certain tendinous chords placed horizontally across it, which are capable of considerable vibration, so as to produce sound, in the same manner as it is produced by the strings of a violin or a harpsichord: and he supposes that the air, as it passes out from the lungs, acts as a bow on these strings, while the efforts of the breast and lungs regulate its motion, and produce the variety of tones. So that according to this system the variation in the voice is not occasioned by the dilatation or contraction of the glottis, but by the distension or relaxation of these strings, the sound being more or less acute in proportion as they are more or less stretched out. Another writer on this subject supposes, that the organ of voice is a double instrument, which produces in unison two sounds of a different nature; one by means of the air, and the other by means of the chords of the glottis. Neither of these systems, however, are universally adopted. They are both liable to insuperable difficulties; so that the manner in which the voice is formed has never yet been satisfactorily ascertained: we may observe, however, that the sound produced by the glottis is not articulated. To effect this, it is required to pass through the mouth, where it is differently modified by the action of the tongue, which is either pushed against the teeth, or upwards towards the palate; detaining it in its passage, or permitting it to flow freely, by contracting or dilating the mouth.

SECT. IX. Of Dejection.

By dejection we mean the act of voiding the feces at the anus; and an account of the manner in which this is conducted was reserved for this part of the work, because it seemed to require a knowledge of respiration to be perfectly understood.

The intestines were described as having a peristaltic motion, by which the feces were gradually advancing towards the anus. Now, whenever the feces are accumulated in the intestinum rectum in a sufficient quantity to become troublesome, either by their weight or acrimony, they excite a certain uneasiness which induces us to go to stool.—To effect this, we begin by making a considerable inspiration; in consequence of which the diaphragm is carried downwards towards the lower belly; the abdominal muscles are at the same time contracted in obedience to the will; and the intestines being compressed on all sides, the resistance of the *sphincter* is overcome, and the feces pass out at the anus; which is afterwards drawn up by its longitudinal fibres, which are called *levator ani*, and then by

means of its *sphincter* is again contracted; but it sometimes happens, as in dysenteries for instance, that the feces are very liquid, and have considerable acrimony; and then the irritation they occasion is more frequent, so as to promote their discharge without any pressure from the diaphragm or abdominal muscles; and sometimes involuntarily, as is the case when the sphincter becomes paralytic.

SECT. X. Of the Pericardium, and of the Heart and its Auricles.

¹²¹ THE two membranous bags of the pleura, which were described as forming the mediastinum, recede one from the other, so as to afford a lodgement to a firm membranous sac, in which the heart is securely lodged; this sac, which is the *pericardium*, appears to be composed of two tunics, united to each other by cellular membrane.—The outer coat, which is thick, and in some places of a tendinous complexion, is a production of the mediastinum; the inner coat, which is extremely thin, is reflected over the auricles and ventricles of the heart, in the same manner as the tunica conjunctiva, after lining the eye-lids, is reflected over the eye.

This bag adheres to the tendinous part of the diaphragm, and contains a coagulable lymph, the *liquor pericardii*, which serves to lubricate the heart and facilitate its motions; and seems to be secreted and absorbed in the same manner as it is in the other cavities of the body.

The arteries of the pericardium are derived from the phrenic, and its veins pass into veins of the same name; its nerves are likewise branches of the phrenic.

The size of the pericardium is adapted to that of the heart, being usually large enough to contain it loosely. As its cavity does not extend to the sternum, the lungs cover it in inspiration; and as it every where invests the heart, it effectually secures it from being injured by lymph, pus, or any other fluid, extravasated into the cavities of the thorax.

¹²² The heart is a hollow muscle of a conical shape, situated transversely between the two laminæ of the mediastinum, at the lower part of the thorax; having its basis turned towards the right side, and its point or apex towards the left.—Its lower surface is somewhat flattened towards the diaphragm. Its basis, from which the great vessels originate, is covered with fat, and it has two hollow and fleshy appendages, called *auricles*.—Round these several openings, the heart seems to be of a firm ligamentous texture, from which all its fibres seem to originate; and as they advance from thence towards the apex, the substance of the heart seems to become thinner.

The heart includes two cavities or *ventricles*, which are separated from each other by a fleshy septum; one of these is called the *right*, and the other the *left ventricle*; though perhaps, with respect to their situation, it would be more proper to distinguish them into the *anterior* and *posterior ventricles*.

The heart is exteriorly covered by a very fine membrane; and its structure is perfectly muscular or fleshy, being composed of fibres which are described as passing in different directions; some as being extended longitudinally from the basis to the apex; others, as taking an oblique or spiral course; and a third sort as being

^{Of the Thorax.}

¹²¹ Pericardium.

¹²² Heart, and its auricles.

Of the
Thorax.

being placed in a transverse direction (A).—Within the two ventricles we observe several furrows; and there are likewise tendinous strings, which arise from fleshy *columnæ* in the two cavities, and are attached to the valves of the auricles: That the use of these and the other valves of the heart may be understood, it must be observed, that four large vessels pass out from the basis of the heart, viz. two arteries and two veins; and that each of these vessels is furnished with a thin membranous production, which is attached all round to the borders of their several orifices, from whence hanging loosely down they appear to be divided into two or three distinct portions. But as their uses in the arteries and veins are different, so are they differently disposed. Those of the arteries are intended to give way to the passage of the blood into them from the ventricles, but to oppose its return; and, on the contrary, the valves of the veins are constructed so as to allow the blood only to pass into the heart. In consequence of these different uses, we find the valves of the pulmonary artery and of the aorta attached to the orifices of those vessels, so as to have their concave surfaces turned towards the artery; and their convex surfaces, which mutually meet together, being placed towards the ventricle, only permit the blood to pass one way, which is into the arteries. There are usually three of these valves belonging to the pulmonary artery, and as many to the aorta; and from their figure they are called *valvula semilunares*. The communication between the two great veins and the ventricles is by means of the two appendages or auricles into which the blood is discharged; so that the other valves which may be said to belong to the veins are placed in each ventricle, where the auricle opens into it. The valves in the right ventricle are usually three in number, and are named *valvula tricuspidæ*; but in the left ventricle we commonly observe only two, and these are the *valvula mitrales*. The membranes which form these valves in each cavity are attached so as to project somewhat forward; and both the *tricuspidæ* and the *mitrales* are connected with the tendinous strings, which were described as arising from the fleshy *columnæ*. By the contraction of either ventricle the blood is driven into the artery which communicates with that ventricle; and these tendinous strings being gradually relaxed as the sides of the cavity are brought nearer to each other, the valves naturally close the opening into the auricle, and the blood necessarily directs its course into the then only open passage, which is into the artery; but after this contraction, the heart becomes relaxed, the tendinous strings are again stretched out, and, drawing the valves of the auricle downwards, the blood is poured by the veins into the ventricle, from whence, by another contraction, it is again thrown into the artery, as will be described hereafter. The right ventricle is not quite so long, though somewhat larger than the left; but the latter has more substance than the other; and this seems to be, because it is intended to transmit

the blood to the most distant parts of the body, where-
as the right ventricle distributes it only to the lungs. Of the
Thorax.

The heart receives its nerves from the *par vagum* and the intercostals. The arteries which serve for its nourishment are two in number, and arise from the aorta. They surround in some measure the basis of the heart, and from this course are called the *coronary arteries*. From these arteries the blood is returned by veins of the same name into the auricles, and even into the ventricles.

The muscular bags called the *auricles* are situated at the basis of the heart, at the sides of each other; and, corresponding with the two ventricles, are like those two cavities distinguished into *right* and *left*. These sacs, which are interiorly unequal, have externally a jagged appendix; which, from its having been compared to the extremity of an ear, has given them their name of *auricles*.

SECT. XI. *Angiology, or a Description of the Blood-vessels.*

THE heart has been described as contracting itself, and throwing the blood from its two ventricles into the pulmonary artery and the aorta, and then as relaxing itself and receiving a fresh supply from two large veins, which are the pulmonary vein and the vena cava. We will now point out the principal distributions of these vessels.

The *pulmonary artery* arises from the right ventricle by a large trunk, which soon divides into two considerable branches, which pass to the right and left lobes of the lungs: each of these branches is afterwards divided and subdivided into an infinite number of branches and ramifications, which extend through the whole substance of the lungs; and from these branches the blood is returned by the veins, which, contrary to the course of the arteries, begin by very minute canals, and gradually become larger, forming at length four large trunks called *pulmonary veins*, which terminate in the *left auricle* by one common opening, from whence the blood passes into the *left ventricle*. From this same ventricle arises the *aorta* or *great artery*, which at its beginning is nearly an inch in diameter: it soon sends off two branches, the *coronaries*, which go to be distributed to the heart and its auricles. After this, at or about the third or fourth vertebra of the back, it makes a considerable curvature; from this curvature (B) arise three arteries; one of which soon divides into two branches. The first two are the left subclavian and the left carotid, and the third is a common trunk to the right subclavian and right carotid; though sometimes both the carotids arise distinctly from the aorta.

The two *carotids* ascend within the subclavians, along the sides of the trachea; and when they have reached the larynx, divide into two principal branches, the *internal* and *external carotid*. The first of these runs a little

(A) Authors differ about the course and distinctions of these fibres; and it seems right to observe, that the structure of the heart being more compact than that of other muscles, its fibres are not easily separated.

(B) Anatomists usually call the upper part of this curvature *aorta ascendens*; and the other part of the artery to its division at the iliacs, *aorta descendens*; but they differ about the place where this distinction is to be introduced; and it seems sufficiently to answer every purpose, to speak only of the aorta and its curvature.

Of the **Thorax.** little way backwards in a bending direction; and having reached the under part of the ear, passes through the canal in the os petrosus, and entering into the cavity of the cranium, is distributed to the brain and the membranes which envelope it, and likewise to the eye. The *external carotid* divides into several branches, which are distributed to the larynx, pharynx, and other parts of the neck; and to the jaws, lips, tongue, eyes, temples, and all the external parts of the head.

Each *subclavian* is likewise divided into a great number of branches. It sends off the *vertebral artery*, which passes through the openings we see at the bottom of the transverse processes of the vertebrae of the neck, and in its course sends off many ramifications to the neighbouring parts. Some of its branches are distributed to the spinal marrow, and after a considerable inflection it enters into the cranium, and is distributed to the brain. The *subclavian* likewise sends off branches to the muscles of the neck and scapula; and the mediastinum, thymus, pericardium, diaphragm, the breasts, and the muscles of the thorax, and even of the abdomen, derive branches from the *subclavian*, which are distinguished by different names, alluding to the parts to which they are distributed; as the *mammary*, the *phrenic*, the *intercostal*, &c. But notwithstanding the great number of branches which have been described as arising from the *subclavian*, it is still a considerable artery when it reaches the *axilla*, where it drops its former name, which alludes to its passage under the clavicle, and is called the *axillary* artery; from which a variety of branches are distributed to the muscles of the breast, scapula, and arm.—But its main trunk, taking the name of *brachialis*, runs along on the inside of the arm near the os humeri, till it reaches the joint of the fore-arm, and then it divides into two branches. This division however is different in different subjects; for in some it takes place higher up and in others lower down. When it happens to divide above the joint, it may be considered as a happy disposition in case of an accident by bleeding; for supposing the artery to be unfortunately punctured by the lancet, and that the hæmorrhage could only be stopped by making a ligature on the vessel, one branch would remain unhurt, through which the blood would pass uninterrupted to the fore-arm and hand. One of the two branches of the *brachialis* plunges down under the flexor muscles, and runs along the edge of the ulna; while the other is carried along the outer surface of the radius, and is easily felt at the wrist, where it is only covered by the common integuments. Both these branches commonly unite in the palm of the hand, and form an arterial arch from whence branches are detached to the fingers.

The *aorta* after having given off at its curvature the carotids and subclavians which convey blood to all the upper parts of the body, descends upon the bodies of the vertebrae a little to the left, as far as the os sacrum, where it drops the name of *aorta*, and divides into two considerable branches. In this course, from its curvature to its bifurcation, it sends off several arteries in the following order: 1. One or two little arteries, first demonstrated by Ruysch as going to the bronchi, and called *arteriæ bronchiales Ruyschii*. 2. The *arteriæ œsophageæ*. These are commonly three or four in num-

ber. They arise from the fore-part of the aorta, and are distributed chiefly to the œsophagus. 3. The inferior intercostal arteries, which are distributed between the ribs in the same manner as the arteries of the three or four superior ribs are, which are derived from the subclavian. These arteries send off branches to the medulla spinalis. 4. The diaphragmatic or inferior phrenic arteries, which go to the diaphragm, stomach, omentum, duodenum, pancreas, spleen, liver, and gall-bladder. 5. The celiac, which sends off the coronary-stomachic, the splenic, and the hepatic artery. 6. The superior mesenteric artery, which is distributed to the mesentery and small intestines. 7. The emulgents which go to the kidneys. 8. The arteries, which are distributed to the glandulæ renales. 9. The spermatic. 10. The inferior mesenteric artery, which ramifies through the lower portion of the mesentery and the large intestines.—A branch of this artery which goes to the rectum is called the *internal hæmorrhoidal*. 11. The lumbar arteries, and a very small branch called the *sacra*, which are distributed to the muscles of the loins and abdomen, and to the os sacrum and medulla spinalis.

The trunk of the aorta, when it has reached the last vertebra lumborum, or the os sacrum, drops the name of *aorta*, and separates into two forked branches called the *iliacs*. Each of these soon divides into two branches; one of which is called the *internal iliac*, or *hypogastric artery*, and is distributed upon the contents of the pelvis and upon the muscles on its outer side. One branch called *pudenda communis*, sends small ramifications to the end of the rectum under the name of *hæmorrhoidales externæ*, and is afterwards distributed upon the penis. The other branch, the external iliac, after having given off the circumflex artery of the os ilium and the epigastric, which is distributed to the recti-muscles, passes out of the abdomen under Poupart's ligament, and takes the name of *crural artery*. It descends on the inner part of the thigh close to the os femoris, sending off branches to the muscles, and then sinking deeper in the hind part of the thigh, reaches the ham, where it takes the name of *popliteal*: after this it separates into two considerable branches; one of which is called the *anterior tibial artery*; the other divides into two branches, and these arteries all go to be distributed to the leg and foot.

The blood, which is thus distributed by the aorta to all parts of the body, is brought back by the veins, which are supposed to be continued from the ultimate branches of arteries; and uniting together as they approach the heart, at length form the large trunks, the vena cava ascendens, and vena cava descendens.

All the veins which bring back the blood from the upper extremities, and from the head and breast, pass into the vena cava descendens; and those which return it from the lower parts of the body terminate in the vena cava ascendens; and these two cavas uniting together as they approach the heart, open by one common orifice into the left auricle.

It does not here seem to be necessary to follow the different divisions of the veins as we did those of the arteries; and it will be sufficient to remark, that in general every artery is accompanied by its vein, and that both are distinguished by the same name. But, like

Of the
Thorax.

Of the
Thorax.

like many other general rules, this too has its exceptions (c). The veins, for instance, which accompany the external and internal carotid, are not called the *carotid veins*, but the *external* and *internal jugular*.—In the thorax there is a vein distinguished by a proper name, and this is the *azygos*, or *vena sine pari*. This vein, which is a pretty considerable one, runs along by the right side of the vertebræ of the back, and is chiefly destined to receive the blood from the intercostals on that side, and from the lower half of those on the left side, and to convey it into the *vena cava descendens*. In the abdomen we meet with a vein, which is still a more remarkable one, and this is the *vena portæ*, which performs the office both of an artery and a vein. It is formed by a re-union of all the veins which come from the stomach, intestines, omentum, pancreas, and spleen, so as to compose one great trunk, which goes to ramify through the liver; and after having deposited the bile, its ramifications unite and bring back into the *vena cava*, not only the blood which the *vena portæ* had carried into the liver, but likewise the blood from the hepatic artery. Every artery has a vein which corresponds with it; but the trunks and branches of the veins are more numerous than those of the arteries.—The reasons for this disposition are perhaps not difficult to be explained; the blood in its course through the veins is much farther removed from the source and cause of its motion, which are in the heart, than it was when in the arteries; so that its course is consequently less rapid, and enough of it could not possibly be brought back to the heart in the moment of its dilatation, to equal the quantity which is driven into the arteries from the two ventricles, at the time they contract; and the equilibrium, which is so essential to the continuance of life and health, would consequently be destroyed, if the capacity of the veins did not exceed that of the arteries, in the same proportion that the rapidity of the blood's motion through the arteries exceeds that of its return through the veins.

A large artery ramifying through the body, and continued to the minute branches of veins, which gradually unite together to form a large trunk, may be compared to two trees united to each other at their tops; or rather as having their ramifications so disposed that the two trunks terminate in one common point; and if we farther suppose, that both these trunks and their branches are hollow, and that a fluid is incessantly circulated through them, by entering into one of the trunks and returning through the other, we shall be enabled to conceive how the blood is circulated through the vessels of the human body.

Every trunk of an artery, before it divides, is nearly cylindrical, or of equal diameter through its whole length, and so are all its branches when examined separately. But every trunk seems to contain less blood than the many branches do into which that trunk separates; and each of these branches probably contains

N° 19.

less blood than the ramifications do into which it is subdivided; and it is the same with the veins; the volume of their several ramifications, when considered together, being found to exceed that of the great trunk which they form by their union.

The return of the blood through the veins to the heart, is promoted by the action of the muscles, and the pulsation of the arteries. And this return is likewise greatly assisted by the *valves* which are to be met with in the veins, and which constitute one of the great distinctions between them and the arteries. These valves, which are supposed to be formed by the inner coat of the veins, permit the blood to flow from the extremities towards the heart, but oppose its return. They are most frequent in the smaller veins. As the column of blood increases, they seem to become less necessary; and therefore in the *vena cava ascendens*, we meet with only one valve, which is near its origin.

The arteries are composed of several tunics. Some writers enumerate five of these tunics; but perhaps we may more properly reckon only three, viz. the *nervous*, *muscular*, and *cuticular* coats. The veins are by some anatomists described as having the same number of coats as the arteries; but as they do not seem to be irritable, we cannot with propriety suppose them to have a muscular tunic. We are aware of Dr Verchur's experiments to prove that the jugular and some other veins possess a certain degree of irritability; but it is certain, that his experiments, repeated by others, have produced a different result; and even he himself allows, that sometimes he was unable to distinguish any such property in the veins. Both these series of vessels are nourished by still more minute arteries and veins, which are seen creeping over their coats, and ramifying through their whole substance, and are called *vasa vasorum*; they have likewise many minute branches of nerves.

The arteries are much stronger than the veins, and they seem to require this force to be enabled to resist the impetus with which the blood circulates through them, and to impel it on towards the veins.

When the heart contracts, it impels the blood into the arteries, and sensibly distends them; and these vessels again contract, as the heart becomes relaxed to receive more blood from the auricles; so that the cause of the contraction and dilatation of the *arteries* seems to be easy to be understood, being owing in part to their own contractile power, and in part to the action of the heart: but in the *veins*, the effects of this impulse not being so sensibly felt, and the vessels themselves having little or no contractile power, the blood seems to flow in a constant and equal stream: and this, together with its passing gradually from a small channel into a larger one, seems to be the reason why the *veins* have no pulsatory motion, except the large ones near the heart; and in these it seems to be occasioned by the motion of the diaphragm, and by the regurgitation of the blood in the *cavas*.

SECT.

(c) In the extremities, some of the deep-seated veins, and all the superficial ones, take a course different from that of the arteries.

124

THE heart, at the time it contracts, drives the blood from its ventricles into the arteries; and the arteries being thus filled and distended, are naturally inclined to contract the moment the heart begins to dilate, and ceases to supply them with blood. These alternate motions of contraction and dilatation of the heart and arteries, are distinguished by the names of *systole* and *diastole*. When the heart is in a state of contraction or systole, the arteries are at that instant distended with blood, and in their diastole; and it is in this state we feel their pulsatory motion, which we call the *pulse*. When the heart dilates, and the arteries contract, the blood is impelled onwards into the veins, through which it is returned back to the heart. While the heart, however, is in its systole, the blood cannot pass from the veins into the ventricles, but is detained in the auricles, which are two reservoirs formed for this use, till the diastole, or dilatation of the heart, takes place; and then the distended auricles contract, and drive the blood into the ventricles: so that the auricles have an alternate systole and diastole as well as the heart.

Although both the ventricles of the heart contract at the same time, yet the blood passes from one to the other. In the same moment, for instance, that the left ventricle drives the blood into the aorta, the right ventricle impels it into the pulmonary artery, which is distributed through all the substance of the lungs. The blood is afterwards brought back into the left ventricle by the pulmonary vein, at the same time that the blood is returned by the cava, into the right ventricle, from all the other parts of the body.

This seems to be the mode of action of the heart and its vessels: but the cause of this action has, like all other intricate and interesting subjects, been differently explained. It seems to depend on the stimulus made on the different parts of the heart by the blood itself, which by its quantity and heat, or other properties (D), is perhaps capable of first exciting that motion, which is afterwards continued through life, independent of the will, by a regular return of blood to the auricles, in a quantity proportioned to that which is thrown into the arteries.

The heart possesses the *vis insita*, or principle of irritability, in a much greater degree than any other muscle of the body. The pulse is quicker in young than in old subjects, because the former are *cæt. par.* more irritable than the latter. Upon the same principle we may explain, why the pulse is constantly quicker in weak than in robust persons.

SECT. XIII. *Of the Circulation.*

125

AFTER what has been observed of the structure and action of the heart and its auricles, and likewise of the

VOL. I. Part II.

arteries and veins, there seem to be but very few arguments required to demonstrate the *circulation of the blood*, which has long since been established as a medical truth. This circulation may be defined to be a perpetual motion of the blood, in consequence of the action of the heart and arteries which impel it through all the parts of the body, from whence it is brought back by the veins to the heart.

A very satisfactory proof of this circulation, and a proof easy to be understood, may be deduced from the different effects of pressure on an artery and a vein. If a ligature, for instance, is passed round an artery, the vessel swells considerably between the ligature and the heart; whereas if we tie up a vein, it only becomes filled between the extremity and the ligature, and this is what we every day observe in bleeding. The ligature we pass round the arm on these occasions, compresses the superficial veins; and the return of the blood through them being impeded, they become distended. When the ligature is too loose, the veins are not sufficiently compressed, and the blood continues its progress towards the heart; and, on the contrary, when it is made too tight, the arteries themselves become compressed; and the flow of the blood through them being impeded, the veins cannot be distended.

Another phenomenon, which effectually proves the circulation, is the loss of blood that every living animal sustains by opening only a single artery of a moderate size; for it continues to flow from the wounded vessel till the equilibrium is destroyed which is essential to life. This truth was not unknown to the ancients; and it seems strange that it did not lead them to a knowledge of the circulation, as it sufficiently proves, that all the other vessels must communicate with that which is opened. Galen, who lived more than 1500 years ago, drew this conclusion from it; and if we farther observe, that he describes (after Erasistratus, who flourished about 450 years before him) the several valves of the heart, and determines their disposition and uses, it will appear wonderful, that a period of near 2000 years should afterwards elapse before the true course of the blood was ascertained. This discovery, for which we are indebted to the immortal Harvey, has thrown new lights on physiology and the doctrine of diseases, and constitutes one of the most important periods of anatomical history.

SECT. XIV. *Of the Nature of the Blood.*

BLOOD, recently drawn from a vein into a basin, would seem to be an homogeneous fluid of a red colour (E); but when suffered to rest, it soon coagulates, and divides into two parts, which are distinguished by the names of *crassamentum* and *serum*. The *crassamentum* is the red coagulum, and the *serum* is the water in which it floats. Each of these may be again separated into two others; for the *crassamentum*, by being repeatedly

126

5 C

(D) Dr Harvey long ago suggested, that the blood is possessed of a living principle; and Mr J. Hunter has lately endeavoured to revive this doctrine; in support of which he has adduced many ingenious arguments. The subject is a curious one, and deserves to be prosecuted as an inquiry which cannot but be interesting to physiologists.

(E) The blood, as it flows through the arteries, is observed to be more florid than it is in the veins; and this redness is acquired in its passage through the lungs. *Vid. sect. vii.*

Of the
Thora.

repeatedly washed in warm water, gives out all its red globules, and what remains appears to be composed of the coagulable lymph (F), which is a gelatinous substance, capable of being hardened by fire till it becomes perfectly horny: and if we expose the serum to a certain degree of heat, part of it will be found to coagulate like the white of an egg, and there will remain a clear and limpid water, resembling urine both in its appearance and smell.

The serum and crassamentum differ in their proportion in different constitutions; in a strong person, the crassamentum is in a greater proportion to the serum than in a weak one*; and the same difference is found to take place in diseases (G).

*Hewson's
Experiments.
Eng. Part I.SECT. XV. *Of Nutrition.*

127

THE variety of functions which we have described as being incessantly performed by the living body, and the continual circulation of the blood through it, must necessarily occasion a constant dissipation of the several parts which enter into its composition. In speaking of the insensible perspiration, we observed how much was incessantly passing off from the lungs and the surface of the skin. The discharge by urine is likewise every day considerable; and great part of the bile, saliva, &c. are excluded by stool. But the solid, as well as the fluid parts of the body, require a constant renewal of nutritious particles. They are exposed to the attrition of the fluids which are circulated through them; and the contraction and relaxation they repeat so many thousand times in every day, would necessarily occasion a dissolution of the machine, if the renewal was not proportioned to the waste.

It is easy to conceive how the chyle formed from the aliment is assimilated into the nature of blood, and repairs the loss of the fluid parts of our body; but how the solids are renewed, has never yet been satisfactorily explained. The nutritious parts of the blood are probably deposited by the arteries by exudation through their pores into the tela cellulosa; and as the solid parts of the body are in the embryo only a kind of jelly, which gradually acquires the degree of consistence they are found to have when the body arrives

at a more advanced age; and these same parts which consist of bones, cartilages, ligaments, muscles, &c. are sometimes reduced again by disease to a gelatinous state; we may, with some degree of probability, consider the coagulable lymph as the source of nutrition.

If the supply of nourishment exceeds the degree of waste, the body increases; and this happens in infancy and in youth; for at those periods, but more particularly the former one, the fluids bear a large proportion to the solids; and the fibres being soft and yielding, are proportionably more capable of extension and increase. But when the supply of nutrition only equals the waste, we neither increase nor decrease; and we find this to be the case when the body has attained its full growth or *acme*: for the solids having then acquired a certain degree of firmness and rigidity, do not permit a farther increase of the body. But as we approach to old age, rigidity begins to be in excess, and the fluids (H) bear a much less proportion to the solids than before. The dissipation of the body is greater than the supply of nourishment; many of the smaller vessels become gradually impervious (I); and the fibres, losing their moisture and their elasticity, appear flaccid and wrinkled. The lilies and the roses disappear, because the fluids by which they were produced can no longer reach the extremities of the capillary vessels of the skin. As these changes take place, the nervous power being proportionably weakened, the irritability and sensibility of the body, which were formerly so remarkable, are greatly diminished; and in advanced life, the hearing, the eye-sight, and all the other senses, become gradually impaired.

SECT. XVI. *Of the Glands and Secretions.*

128

THE glands are commonly understood to be small, roundish, or oval bodies, formed by the convolution of a great number of vessels, and destined to separate particular humours from the mass of blood.

They are usually divided into two classes; but it seems more proper to distinguish three kinds of glands, viz. the mucous, conglobate, and conglomerate.

The *mucous glands*, or follicles as they are most commonly called, are small cylindrical tubes continued from

(F) It may not be improper to observe, that till of late the *coagulable lymph* has been confounded with the *serum* of the blood, which contains a substance that is likewise coagulable, though only when exposed to heat, or combined with certain chemical substances; whereas the other coagulates spontaneously when exposed to the air or to rest.

(G) When the blood separates into *serum* and *crassamentum*, if the latter be covered with a crust of a whitish or buff colour, it has been usually considered as a certain proof of the blood's being in a state of too great viscosity. This appearance commonly taking place in inflammatory diseases, has long served to confirm the theory which ascribes the cause of inflammation to lentor and obstructions. But from the late Mr Hewson's experiments it appears, that when the action of the arteries is increased, the blood, instead of being more viscid, is, on the contrary, more fluid than in the ordinary state, previous to inflammation: and that in consequence of this, the coagulable lymph suffers the red globules, which are the heaviest part of the blood, to fall down to the bottom before it coagulates: so that the crassamentum is divided into two parts; one of which is found to consist of the coagulable lymph alone (in this case termed the *buff*); and the other, partly of this and partly of the red globules.

(H) As the fluids become less in proportion to the solids, their acrimony is found to increase; and this may perhaps compensate for the want of fluidity in the blood, by diminishing its cohesion.

(I) In infancy, the arteries are numerous and large in respect to the veins, and the lymphatic glands are larger than at any other time of life; whereas, in old age, the capacity of the venous system exceeds that of the arteries, and the lymphatic system almost disappears.

Of the
Thorax

from the ends of arteries. In some parts of the body, as in the tonsils, for example, several of these follicles may be seen folded together in one common covering, and opening into one common sinus. These follicles are the vessels that secrete and pour out mucus in the mouth, œsophagus, stomach, intestines, and other parts of the body.

The *conglobate glands* are peculiar to the lymphatic system. Every lymphatic vein passes through a gland of this kind in its way to the thoracic duct. They are met with in different parts of the body, particularly in the axilla, groin, and mesentery, and are either solitary or in distinct clusters.

The *conglomerate glands* are of much greater bulk than the conglobate, and seem to be an assemblage of many smaller glands. Of this kind are the liver, kidneys, &c. Some of them, as the pancreas, parotids, &c. have a granulated appearance. All these conglomerate glands are plentifully supplied with blood-vessels; but their nerves are in general very minute, and few in number. Each little granulated portion furnishes a small tube, which unites with other similar ducts, to form the common excretory duct of the gland.

The principal glands, and the humours they secrete, have been already described in different parts of this work; and there only remains for us to examine the general structure of the glands, and to explain the mechanism of secretion. On the first of these subjects two different systems have been formed: each of which has had, and still continue to have, its adherents. One of these systems was advanced by Malpighi, who supposed that an artery entering into a gland ramifies very minutely through its whole substance; and that its branches ultimately terminate in a vesicular cavity or follicle, from whence the secreted fluid passes out through the excretory duct. This doctrine at first met with few opponents; but the celebrated Rayssch, who first attempted minute injections with wax, afterwards disputed the existence of these follicles, and asserted, that every gland appears to be a continued series of vessels, which after being repeatedly convoluted in their course through its substance, at length terminate in the excretory duct. Anatomists are still divided between these two systems: that of Malpighi, however, seems to be the best founded.

The mode of secretion has been explained in a variety of ways, and they are all perfectly hypothetical. In such an inquiry, it is natural to ask, how one gland constantly separates a particular humour, while another gland secretes one of a very different nature from the blood? The bile, for instance, is separated by the liver, and the urine by the kidneys. Are these secretions to be imputed to any particular disposition in the fluids, or is their cause to be looked for in the solids?

It has been supposed, that every gland contains within itself a fermenting principle, by which it is enabled to change the nature of the blood it receives, and to endue it with a particular property. So that, according to this system, the blood, as it circulates through the kidneys, becomes mixed with the fermenting principle of those glands, and a part of it is converted into urine; and again, in the liver, in the salivary and other glands, the bile, the saliva, and other

Of the
Thorax

juices, are generated from a similar cause. But it seems to be impossible for any liquor to be confined in a place exposed to the circulation, without being carried away by the torrent of blood, every part of which would be equally affected; and this system of fermentation has long been rejected as vague and chimerical. But as the cause of secretion continued to be looked for in the fluids, the former system was succeeded by another, in which recourse was had to the analogy of the humours. It was observed, that if paper is moistened with water, and oil and water are afterwards poured upon it, that the water only will be permitted to pass through it; but that, on the other hand, if the paper has been previously soaked in oil instead of water, the oil only, and not the water, will be filtered through it. These observations led to a supposition, that every secretory organ is originally furnished with a humour analogous to that which it is afterwards destined to separate from the blood; and that in consequence of this disposition, the secretory vessels of the liver, for instance, will only admit the bilious particles of the blood, while all the other humours will be excluded. This system is an ingenious one, but the difficulties with which it abounds are unanswerable: for oil and water are immiscible; whereas the blood, as it is circulated through the body, appears to be an homogeneous fluid. Every oil will pass through a paper moistened only with one kind of oil; and wine, or spirits mixed with water, will easily be filtered through a paper previously soaked in water. Upon the same principle, all our humours, though differing in their other properties, yet agreeing in that of being perfectly miscible with each other, will all easily pass through the same filtre.—But these are not all the objections to this system. The humours which are supposed to be placed in the secretory vessels for the determination of similar particles from the blood, must be originally separated without any analogous fluid; and that which happens once, may as easily happen always. Again, it sometimes happens, from a vicious disposition, that humours are filtered through glands which are naturally not intended to afford them a passage; and when this once has happened, it ought, according to this system, to be expected always to do so: whereas this is not the case; and we are, after all, naturally led to seek for the cause of secretion in the solids. It does not seem right to ascribe it to any particular figure of the secretory vessels; because the soft texture of those parts does not permit them to preserve any constant shape, and our fluids seem to be capable of accommodating themselves to every kind of figure. Some have imputed it to the difference of diameter in the orifices of the different secretory vessels. To this doctrine objections have likewise been raised; and it has been argued, that the vessels of the liver, for instance, would, upon this principle, afford a passage not only to the bile, but to all the other humours of less consistence with it. In reply to this objection, it has been supposed, that secondary vessels exist, which originate from the first, and permit all the humours thinner than the bile to pass through them.

Each of these hypotheses is probably very remote from the truth.

EXPLANATION OF PLATE XXIII.

THIS Plate represents the Heart in situ, all the large Arteries and Veins, with some of the Muscles, &c.

MUSCLES, &c.—SUPERIOR EXTREMITY.—a, Mafeter. b, Complexus. c, Digastricus. d, Os hyoides. e, Thyroid gland. f, Levator scapulæ. g, Cucullaris. h h, The clavicles cut. i, The deltoid muscle. k, Biceps flexor cubiti cut. l, Coraco-brachialis. m, Triceps extensor cubiti. n, The heads of the pronator teres, flexor carpi radiales, and flexor digitorum sublimis, cut. o, The flexor carpi ulnaris, cut at its extremity. p, Flexor digitorum profundus. q, Supinator radii longus, cut at its extremity. r, Ligamentum carpi transversale. s, Extensores carpi radiales. t, Latissimus dorsi. u, Anterior edge of the serratus anticus major. v v, The inferior part of the diaphragm. w w, Its anterior edge cut. x x, The kidneys. y, Transversus abdominis. z, Os ilium.

INFERIOR EXTREMITY.—a, Psoas magnus. b, Iliacus internus. c, The fleshy origin of the tensor vaginæ femoris. d d, The ossa pubis cut from each other. e, Musculus pectineus cut from its origin. f, Short head of the triceps adductor femoris cut. g, The great head of the triceps. h, The long head cut. i, Vastus internus. k, Vastus externus. l, Crureus. m, Gemellus. n, Soleus. o, Tibia. p, Peronæus longus. q, Peronæus brevis. r, Fibula.

HEART and BLOOD-VESSELS.—A, The heart, with the coronary arteries and veins. B, The right auricle of the heart. C, The aorta ascendens. D, The left subclavian artery. E, The left carotid artery. F, The common trunk which sends off the right subclavian and

right carotid arteries. G, The carotis externa. H, Arteria facialis, which sends off the coronary arteries of the lips. I, Arteria temporalis profunda. K, Aorta descendens. L L, The iliac arteries,—which send off M M, The femoral or crural arteries. N. B. The other arteries in this figure have the same distribution as the veins of the same name:—And generally, in the anatomical plates, the description to be found on the one side, points out the same parts in the other. 1, The frontal vein. 2, The facial vein. 3, Vena temporalis profunda. 4, Vena occipitalis. 5, Vena jugularis externa. 6, Vena jugularis interna, covering the arteria carotis communis. 7, The vascular arch on the palm of the hand, which is formed by, 8, the radial artery and vein, and, 9, the ulnar artery and vein. 10 10, Cephalic vein. 11, Basilic vein, that on the right side, cut. 12, Median vein. 13, The humeral vein, which, with the median, covers the humeral artery. 14 14, The external thoracic or mammary arteries and veins. 15, The axillary vein, covering the artery. 16 16, The subclavian veins, which, with (6 6) the jugulars, form, 17 The vena cava superior. 18, The cutaneous arch of veins on the fore part of the foot. 19, The vena tibialis antica, covering the artery. 20, The vena profunda femoris, covering the artery. 21, The upper part of the vena saphena major. 22, The femoral vein. 23 23, The iliac veins. 24 24, Vena cava inferior. 25 25, The renal veins covering the arteries. 26 26, The diaphragmatic veins.

PART V. OF THE BRAIN AND NERVES.

SECT. I. Of the Brain and its Integuments.

129 THE bones of the cranium were described in the osteological part of this work, as inclosing the brain, and defending it from external injury: but they are not its only protection; for when we make an horizontal section through these bones, we find this mass everywhere surrounded by two membranes (κ), the dura and pia mater.—The first of these lines the interior surface of the cranium, to which it everywhere adheres strongly (λ), but more particularly at the sutures, and at the many foramina through which vessels pass between it

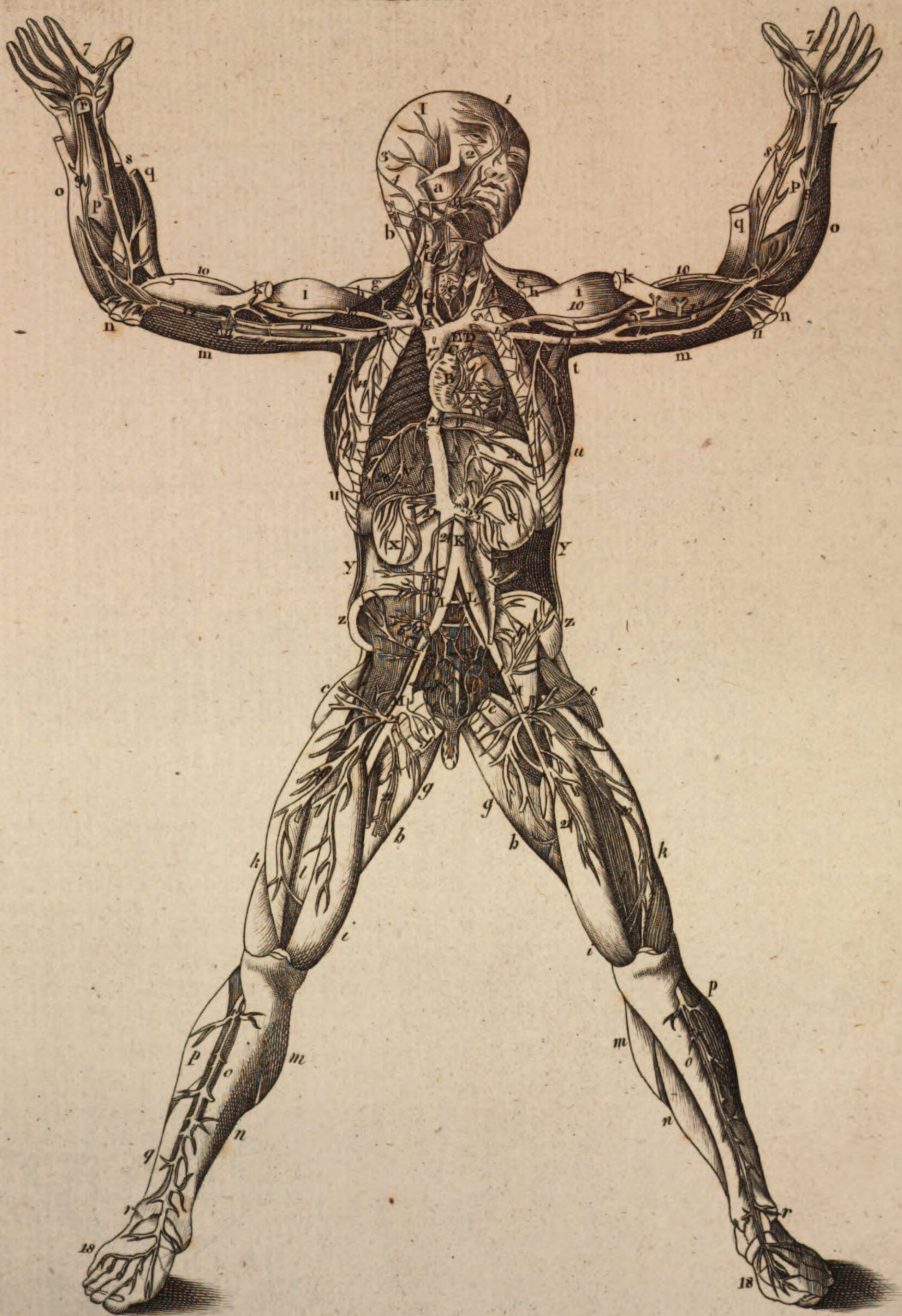
130
Integuments of
the brain.

and the pericranium. The *dura mater* (μ) is perfectly smooth and inelastic, and its inner surface is constantly bedewed with a fine pellucid fluid, which everywhere separates it from the pia mater. The *dura mater* sends off several considerable processes, which divide the brain into separate portions, and prevent them from compressing each other. Of these processes there is one superior and longitudinal, called the *falx*, or *falciform process*, from its resemblance to a scythe. It arises from the spine of the os frontis, near the crista galli, and extending along in the direction of the sagittal future, to beyond the lamboidal future, divides the brain into two hemis-

(κ) The Greeks called these membranes *meninges*; but the Arabians, supposing them to be the source of all the other membranes of the body, afterwards gave them the names of *dura* and *pia mater*; by which they are now usually distinguished.

(λ) In young subjects this adhesion is greater than in adults; but even then, in the healthy subject, it is nowhere easily separable, without breaking through some of the minute vessels by means of which it is attached to the bone.

(μ) This membrane is commonly described as consisting of two laminae; of which the external one is supposed to perform the office of periosteum internum to the cranium, while the internal one forms the folds and processes of the *dura mater*. In the natural state, however, no such separation is apparent; like other membranes, we may indeed divide it, not into two only, but many laminae; but this division is artificial, and depends on the dexterity of the anatomist.



A. Bell Pin. Wal. Sculptor fecit.

Of the
Brain and
Nerves.

Of the
Brain and
Nerves.

The brain.

132
Cerebrum.

hemispheres. A little below the lamboidal suture, it divides into two broad wings or expansions called the *transverse* or *lateral processes*, which prevents the lobes of the cerebrum from pressing on the cerebellum. Besides these there is a fourth, which is situated under the transverse processes, and being continued to the spine of the occiput, divides the cerebellum into two lobes.

The blood, after being distributed through the cavity of the cranium by means of the arteries, is returned, as in the other parts of the body, by veins which all pass on to certain channels, situated behind these several processes.

These canals or sinuses communicate with each other, and empty themselves into the internal jugular veins, which convey the blood into the vena cava. They are in fact triangular veins, running through the substance of the dura mater, and, like the processes, are distinguished into *longitudinal* and *lateral*; and where these three meet, and where the fourth process passes off, we observe a fourth sinus, which is called *torcular*; Herophilus, who first described it, having supposed that the blood at the union of these two veins, is, as it were, in a press.

Besides these four canals, which were known to the ancients, modern anatomists enumerate many others, by giving the appellation of *sinuses* to other veins of the dura mater, which for the most part empty themselves into some of those we have just now described. There are the inferior longitudinal sinus, the superior and inferior petrous sinuses, the cavernous sinuses, the circular sinus, and the anterior and posterior occipital sinuses.

These sinuses or veins, by being conveyed through a thick dense membrane, firmly suspended, as the dura mater is, within the cranium, are less liable to rupture; at the same time they are well supported, and by running every where along the inner surface of the bones, they are prevented from pressing on the substance of the brain. To prevent too great a dilatation of them, we find filaments (called *chordæ Willisii*, from their having been first noticed by Willis) stretched across their cavities; and the oblique manner in which the veins from the brain run through the substance of the brain into these channels, serves the purpose of a valve, which prevents the blood from turning back into the smaller and weaker vessels of the brain.

The *pia mater* is a much softer and finer membrane than the dura mater; being exceedingly delicate, transparent, and vascular. It invests every part of the brain, and sends off an infinite number of elongations, which insinuate themselves between the convolutions, and even into the substance of the brain. This membrane is composed of two laminæ; of which the exterior one is named *tunica arachnoidea*, from its thinness, which is equal to that of a spider's web. These two laminæ are intimately adherent to each other at the upper part of the brain, but are easily separable at the basis of the brain, and through the whole length of the medulla spinalis. The external layer or *tunica arachnoidea*, appears to be spread uniformly over the surface of the brain, but without entering into its furrows as the inner layer does; the latter being found to insinuate itself between the convolutions, and even into the interior cavities of the brain. The blood-vessels of the

brain are distributed through it in their way to that organ, and are therefore divided into very minute ramifications, before they penetrate the substance of the brain.

There are several parts included under the general denomination of *brain*. One of these, which is of the softest consistence, and fills the greatest part of the cavity of the cranium, is the *cerebrum* or *brain*, properly so called. Another portion, which is seated in the inferior and posterior part of the head, is the *cerebellum*; and a third, which derives its origin from both these, is the *medulla oblongata*.

The *cerebrum* is a medullary mass of a moderate consistence, filling up exactly all the upper part of the cavity of the cranium, and divided into two hemispheres by the falx of the dura mater. Each of these hemispheres is usually distinguished into an *anterior*, a *middle*, and a *posterior lobe*. The first of these is lodged on the orbital processes of the os frontis; the middle lobes lie in the middle fossæ of the basis of the cranium, and the posterior lobes are placed on the transverse septum of the os occipitis, immediately over the cerebellum, from which they are separated by the lateral processes of the dura mater. These two portions afford no distinguishing mark of separation; and on this account Haller, and many other modern anatomists, omit the distinction of middle lobe, and speak only of the anterior and posterior lobes of the brain.

The cerebrum appears to be composed of two distinct substances. Of these, the exterior one, which is of a greyish or ash-colour, is called the *cortex*, and is somewhat softer than the other, which is very white, and is called *medulla*, or *substantia alba*.

After having removed the falx, and separated the two hemispheres from each other, we perceive a white convex body, the corpus callosum, which is a portion of the medullary substance, uniting the two hemispheres to each other, and not invested by the cortex. By making an horizontal incision in the brain, on a level with this corpus callosum, we discover two oblong cavities, named the *anterior* or *lateral ventricles*, one in each hemisphere. These two ventricles, which communicate with each other by a hole immediately under the plexus choroides, are separated laterally by a very fine medullary partition, called *septum lucidum*, from its thinness and transparency. The lower edge of this septum is fixed to the fornix, which is a kind of medullary arch (as its name implies) situated under the corpus callosum, and nearly of a triangular shape. Anteriorly the fornix sends off two medullary chords, called its *anterior crura*; which seem to be united to each other by a portion of medullary substance, named *commissura anterior cerebri*. These crura diverging from one another, are lost at the outer side of the lower and fore part of the third ventricle. Posteriorly the fornix is formed into two other crura, which unite with two medullary protuberances, called *pedes hippocampi*, and sometimes *cornua ammonis*, that extend along the back part of the lateral ventricles. The concave edge of the pedes hippocampi is covered by a medullary lamina, called *corpus fimbriatum*.

Neither the edges of the fornix, nor its posterior crura, can be well distinguished, till we have removed the plexus choroides. This is a production of the pia mater, which is spread over the lateral ventricles. Its loose

Of the
Brain and
Nerves.

loose edges are collected, so as to appear like a vascular band on each side.

When we have removed this plexus, we discover several other protuberances included in the lateral ventricles. These are the corpora striata, the thalami nervorum opticorum, the tubercula quadrigemina, and the pineal gland.

The *corpora striata* are two curved oblong eminences, that extend along the anterior part of the lateral ventricles. They derive their name from their striated appearance, which is owing to an intermixture of the cortical and medullary substances of the brain. The *thalami nervorum opticorum*, are so called, because the optic nerves arise chiefly from them, and they are likewise composed both of the cortex and medulla. They are separated from the corpora striata only by a kind of medullary chord, the *geminum centrum semi-circulare*. The thalami are nearly of an oval shape, and are situated at the bottom of the upper cavity of the lateral ventricles. They are closely united, and at their convex part seem to become one body.

Anteriorly, in the space between the thalami, we observe an orifice by which the lateral ventricles communicate, and another leads down from this, under the different appellations of *foramen commune anterius*, *vulva*, *iter ad infundibulum*, but more properly *iter ad tertium ventriculum*; and the separation of the thalami from each other posteriorly, forms another opening or interstice called *anus*. This has been supposed to communicate with the third ventricle; but it does not, the bottom of it being shut up by the pia mater. The back-part of the anus is formed by a kind of medullary band, which connects the thalami to each other, and is called *commissura posterior cerebri*.

Behind the thalami and commissura posterior, we observe a small, soft, greyish, and oval body, about the size of a pea. This is the glandula pinealis; it is described by Galen under the name of *conarion*, and has been rendered famous by Descartes, who supposed it to be the seat of the soul. Galen seems formerly to have entertained the same opinion. Some modern writers have, with as little reason, imagined that the soul is placed in the corpus callosum.

The pineal gland rests upon four remarkable eminences, disposed in pairs, and seated immediately below it. These tubercles, which by the ancients were called *testes* and *nates*, have, since the time of Winslow, been more commonly named *tubercula quadrigemina*.

Under the thalami we observe another cavity, the third ventricle, which terminates anteriorly in a small medullary canal, the infundibulum, that leads to the glandula pituitaria. It has been doubted, whether the infundibulum is really hollow; but some late experi-

* *Disp. de* ments on this part of the brain * by Professor Murray of Upsal, clearly prove it to be a medullary canal, surrounded by both laminæ of the pia mater. After free-

† *Ratio*
Med.
tom. vi.
p. 271.

zing the brain, this channel was found filled with ice; and de Haen tells † us, he found it dilated, and filled with a calcereous matter (N).

The soft spongy body in which the infundibulum

terminates, was by the ancients supposed to be of a glandular structure, and destined to filter the serosity of the brain. Spigelius pretended to have discovered its excretory duct, but it seems certain that no such duct exists. It is of an oblong shape, composed, as it were, of two lobes. In ruminant animals it is much larger than in man.

From the posterior part of the third ventricle, we see a small groove or channel, descending obliquely backwards. This channel, which is called the *aqueduct of Sylvius*, though it was known to the ancients, opens into another cavity of the brain, placed between the cerebellum and medulla oblongata, and called the *fourth ventricle*.

The *cerebellum*, which is divided into two lobes, is commonly supposed to be of a firmer texture than the cerebrum; but the truth is, that in the greater number of subjects, there appears to be no sensible difference in the consistence of these two parts. It has more of the cortical than of the medullary substance in its composition.

The furrow that divides the two lobes of the cerebellum leads anteriorly to a process, composed of medullary and cortical substances, covered by the pia mater; and which, from its being divided into numerous furrows, resembling the rings of the earth-worm, is named *processus vermiformis*. This process forms a kind of ring in its course between the lobes.

The surface of the cerebellum does not afford those circumvolutions which appear in the cerebrum; but instead of these, we observe a great number of minute furrows, running parallel to each other, and nearly in a transverse direction. The pia mater insinuates itself into these furrows.

When we cut into the substance of the cerebellum, from above downwards, we find the medullary part running in a kind of ramifying course, and exhibiting an appearance that has gotten the name of *arbor vitae*. These ramifications unite to form a medullary trunk; the middle, anterior, and most considerable part of which forms two processes, the *crura cerebelli*, which unite with the *crura cerebri*, to form the medulla oblongata. The rest furnishes two other processes, which lose themselves under the nates, and thus unite the lobes of the cerebellum to the posterior part of the cerebrum. Under the nates we observe a transverse medullary line, or *linea alba*, running from one of these processes to the other; and between them we find a very thin medullary lamina, covered with the pia mater, which the generality of anatomists have (though seemingly without reason) considered as a valve formed for closing the communication between the fourth ventricle and the *aquæductus Sylvii*. Vieussens named it *valvula major cerebri*.

The *medulla oblongata* is situated in the middle, lower, and posterior part of the cranium, and may be considered as a production or continuation of the whole medullary substance of the cerebrum and cerebellum, being formed by the union of two considerable medullary processes of the cerebrum, called *crura cerebri*,

(N) The under part of it, however, appears to be impervious; at least no injection that can be depended on has been made to pass from it into the glandula pituitaria without laceration of parts.

Of the
Brain and
Nerve.

bri, with two other smaller ones from the cerebellum, which were just now spoken of under the name of *crura cerebelli*.

The *crura cerebri* arise from the middle and lower part of each hemisphere. They are separated from each other at their origin, but are united below, where they terminate in a middle protuberance, the *pons Varolii*, so called, because Varolius compared it to a bridge. This name, however, can convey no idea of its real appearance. It is, in fact, nothing more than a medullary protuberance, nearly of a semi-spherical shape, which unites the *crura cerebri* to those of the cerebellum.

Between the *crura cerebri*, and near the anterior edge of the *pons Varolii*, are two tubercles, composed externally of medullary, and internally of cineritious, substance, to which Eustachius first gave the name of *eminentie mamillares*.

Along the middle of the posterior surface of the medulla oblongata, where it forms the anterior part of the fourth ventricle, we observe a kind of furrow which runs downwards and terminates in a point. About an inch above the lower extremity of this fissure, several medullary filaments are to be seen running towards it on each side in an oblique direction, so as to give it the appearance of a writing-pen; hence it is called *calamus scriptorius*.

From the posterior part of the *pons Varolii*, the medulla oblongata descends obliquely backwards; at its fore-part, immediately behind the *pons Varolii*, we observe two pair of eminences, which were described by Eustachius, but received no particular appellation till the time of Vieussens, who gave them the names of *corpora olivaria* and *corpora pyramidalia*. The former are the outermost, being placed one on each side. They are nearly of an oval shape, and are composed of medulla, with streaks of cortical substance. Between these are the *corpora pyramidalia*, each of which terminates in a point. In the human subject these four eminences are sometimes not easily distinguished.

135
Medulla
spinalis.

The *medulla spinalis*, or *spinal marrow*, which is the name given to the medullary chord that is extended down the vertebral canal, from the great foramen of the occipital bone to the bottom of the last lumbar vertebra, is a continuation of the medulla oblongata. Like the other parts of the brain, it is invested by the dura and pia mater. The first of these, in its passage out of the cranium, adheres to the foramen of the os occipitis. Its connection with the ligamentary substance that lines the cavity of the spine, is only by means of cellular membrane; but between the several vertebræ, where the nerves pass out of the spine, it sends off prolongations, which adhere strongly to the vertebral ligaments. Here, as in the cranium, the dura mater has its sinuses or large veins. These are

two in number, and are seen running on each side of the medullary column, from the foramen magnum of the os occipitis to the lower part of the os sacrum. They communicate together by ramifying branches at each vertebra, and terminate in the vertebral, intercostal, and sacral veins.

Of the
Brain and
Nerves.

The pia mater is connected with the dura mater by means of a thin transparent substance, which from its indentations between the spinal nerves has obtained the name of *ligamentum denticulatum*. It is somewhat firmer than the tunica orochnoidea, but in other respects resembles that membrane. Its use is to support the spinal marrow, that it may not affect the medulla oblongata by its weight.

The spinal marrow itself is externally of a white colour; but upon cutting into it we find its middle-part composed of a darker coloured mass, resembling the cortex of the brain. When the marrow has reached the first lumbar vertebra, it becomes extremely narrow, and at length terminates in an oblong protuberance; from the extremity of which the pia mater sends off a prolongation or ligament, resembling a nerve, that perforates the dura mater, and is fixed to the os coccygis.

The medulla spinalis gives rise to 30 or 31 pair of nerves, but they are not all of the same size, nor do they all run in the same direction. The upper ones are thinner than the rest, and are placed almost transversely: as we descend we find them running more and more obliquely downwards, till at length their course is almost perpendicular, so that the lowermost nerves exhibit an appearance that is called *cauda equina*, from its resemblance to a horse's tail.

The arteries that ramify through the different parts of the brain, are derived from the internal carotid and from the vertebral arteries. The medulla spinalis is supplied by the anterior and posterior spinal arteries, and likewise receives branches from the cervical, the inferior and superior intercostal, the lumbar, and the sacral arteries.

SECT. II. Of the Nerves.

THE nerves are medullary chords, differing from each other in size, colour, and consistence, and deriving their origin from the medulla oblongata and medulla spinalis. There are 39, and sometimes 40, pair of these nerves; nine (9) of which originate from the medulla oblongata, and 30 or 31 from the medulla spinalis. They appear to be perfectly inelastic, and likewise to possess no irritability. If we irritate muscular fibres, they immediately contract; but nothing of this sort happens if we irritate a nerve. They carry with them a covering from the pia mater; but derive no tunic from the dura mater, as hath been generally, tho' erroneously, supposed, ever since the time of Galen (p), the

136

(o) It has been usual to describe ten pair of nerves as arising from the medulla oblongata; but as the tenth pair arise in the same manner as the other spinal nerves, Santorini, Heister, Haller, and others, seem very properly to have classed them among the nerves of the spine.

(p) Baron Haller and Professor Zinn seem to have been the first who demonstrated, that the dura mater is reflected upon and adheres to the periosteum at the edges of the foramina that afford a passage to the nerves out of the cranium and vertebral canal, or is soon lost in the cellular substance.

Of the
Brain and
Nerves.

the outer covering of the nerves being in fact nothing more than cellular membrane. This covering is very thick where the nerve is exposed to the action of muscles; but where it runs through a bony canal, or is secure from pressure, the cellular tunic is extremely thin, or altogether wanting. We have instances of this in the *portio mollis* of the auditory nerve, and in the nerves of the heart.

By elevating, carefully and gently, the brain from the basis of the cranium, we find the first nine pair arising in the following order: 1. The *nervi olfactorii*, distributed through the pituitary membrane, which constitutes the organ of smell. 2. The *optici*, which go to the eyes, where they receive the impressions of visible objects. 3. The *oculorum motores*, so called because they are distributed to the muscles of the eye. 4. The *pathetici*, distributed to the superior oblique muscles of the eyes, the motion of which is expressive of certain passions of the soul. 5. The nerves of this pair soon divide into three principal branches, and each of these has a different name. Its upper division is the *ophthalmicus*, which is distributed to various parts of the eyes, eye-lids, fore-head, nose, and integuments of the face. The second is called the *maxillaris superior*, and the third *maxillaris inferior*; both which names allude to their distribution. 6. The *abductores*; each of these nerves is distributed to the abductor muscle of the eye, so called, because it helps to draw the globe of the eye from the nose. 7. The *auditorii* (Q), which are distributed through the organs of hearing. 8. The *par vagum*, which derives its name from the great number of parts, to which it gives branches both in the thorax and abdomen. 9. The *linguales*, or *hypoglossi*, which are distributed to the tongue, and appear to contribute both to the organ of taste and to the motions of the tongue (R).

It has already been observed, that the spinal marrow sends off 30 or 31 pair of nerves; these are chiefly distributed to the exterior parts of the trunk and to the extremities. They are commonly distinguished into the *cervical*, *dorsal*, *lumbar*, and *sacral nerves*. The *cervical*, which pass out from between the several vertebrae of the neck, are eight (s) in number; the *dorsal*, twelve; the *lumbar*, five; and the *sacral*, five or six;

N° 19.

the number of the latter depending on the number of holes in the os sacrum. Each spinal nerve at its origin is composed of two fasciculi of medullary fibres. One of these fasciculi arises from the anterior, and the other from the posterior, surface of the medulla. These fasciculi are separated by the *ligamentum denticulatum*; after which we find them contiguous to one another. They then perforate the *dura mater*, and unite to form a considerable knot or ganglion. Each of these ganglions sends off two branches; one anterior, and the other posterior. The anterior branches communicate with each other at their coming out of the spine, and likewise send off one, and sometimes more branches, to assist in the formation of the intercostal nerve.

The knots or ganglions of the nerves just now spoken of, are not only to be met with at their exit from the spine, but likewise in various parts of the body. They occur in the nerves of the medulla oblongata, as well as in those of the spine. They are not the effects of disease, but are to be met with in the same parts of the same nerves, both in the foetus and adult. They are commonly of an oblong shape, and of a greyish colour, somewhat inclined to red, which is perhaps owing to their being extremely vascular. Internally we are able to distinguish something like an intermixture of the nervous filaments.

Some writers have considered them as so many little brains; Lancisi fancied he had discovered muscular fibres in them, but they are certainly not of an irritable nature. A late writer, Dr Johnstone*, imagines they are intended to deprive us of the power of the will over certain parts, as the heart, for instance; but if this hypothesis were well founded, we should meet with them only in nerves leading to involuntary muscles; whereas it is certain, that the voluntary muscles receive their nerves through ganglions. Doctor Monro, from observing the accurate intermixture of the minute nerves which compose them, considers them as new sources of nervous energy†.

The nerves, like the blood-vessels, in their course through the body, communicate with each other; and each of these communications constitutes what is called a *plexus*, from whence branches are again detached to different parts of the body. Some of these are constant

* Essay on
the Use of
the Gangli-
ons of the
Nerves.

† Observa-
tions on the
Nervous
System.

(Q) This pair, soon after its entrance into the meatus auditorius internus, separates into two branches. One of these is of a very soft and pulpy consistence, is called the *portio mollis* of the seventh pair, and is spread over the inner part of the ear. The other passes out through the aqueduct of Fallopius in a firm chord, which is distinguished as the *portio dura*, and is distributed to the external ear and other parts of the neck and face.

(R) Heister has summed up the uses of these nine pair of nerves in the two following Latin verses:

"*Olfaciens, cernens, oculosque movens, patiensque,*
"*Gustans, abducens, audiensque, vagansque, loquensque.*"

(s) Besides these, there is another pair called *accessorii*, which arises from the medulla spinalis at its beginning; and ascending through the great foramen of the os occipitis into the cranium, passes out again close to the eighth pair, with which, however, it does not unite; and it is afterwards distributed chiefly to the muscles of the neck, back, and scapula. In this course it sends off filaments to different parts, and likewise communicates with several other nerves. Physiologists are at a loss how to account for the singular origin and course of these *nervi accessorii*. The ancients considered them as branches of the eighth pair, distributed to muscles of the scapula: Willis likewise considered them as appendages to that pair, and on that account named them *accessorii*. They are sometimes called the *spinal* pair; but as this latter name is applicable to all the nerves of the spine indiscriminately, it seems better to adopt that given by Willis.

Of the
Brain and
Nerves.

stant and considerable enough to be distinguished by particular names, as the *semilunar plexus*; the *pulmonary plexus*; the *hepatic*, the *cardiac*, &c.

It would be foreign to the purpose of this work, to follow the nerves through all their distributions; but it may be remembered, that in describing the different viscera, mention was made of the nerves distributed to them. There is one pair, however, called the *intercostal*, or *great sympathetic nerve*, which seems to require particular notice, because it has an almost universal connection and correspondence with all the other nerves of the body. Authors are not perfectly agreed about the origin of the intercostal; but it may perhaps not improperly be described, as beginning from filaments of the fifth and sixth pair; it then passes out of the cranium, through the bony canal of the carotid, from whence it descends laterally close to the bodies of the vertebræ, and receives branches from almost all the vertebral nerves; forming almost as many ganglions in its course through the thorax and abdomen. It sends off an infinite number of branches to the viscera in those cavities, and forms several plexus with the branches of the eighth pair or par vagum.

That the nerves are destined to convey the principles of motion and sensibility to the brain from all parts of the system, there can be no doubt; but how these effects are produced, no one has ever yet been able to determine. The inquiry has been a constant source of hypothesis in all ages, and has produced some ingenious ideas, and many erroneous positions, but without having hitherto afforded much satisfactory information.

Some physiologists have considered a trunk of nerves as a solid chord, capable of being divided into an infinite number of filaments, by means of which the impressions of feeling are conveyed to the sensorium commune. Others have supposed it to be a canal, which afterwards separates into more minute channels; or, perhaps, as being an assemblage of many very small and distinct tubes, connected to each other, and thus forming a cylindrical chord. They who contend for their being solid bodies, are of opinion, that feeling is occasioned by vibration; so that, for instance, according to this system, by pricking the finger, a vibration would be occasioned in the nerve, distributed through its substance; and the effects of this vibration, when extended to the sensorium, would be an excital of pain. But the inelasticity, the softness, the connection, and the situation of the nerves, are so many proofs that vibration has no share in the cause of feeling.

Others have supposed, that in the brain and spinal marrow, a very subtle fluid is secreted, and from thence conveyed through the imperceptible tubes, which they consider as existing in the nerves. They have further supposed, that this very subtle fluid, to which they have given the name of *animal spirits*, is secreted in the cortical substance of the brain and spinal marrow, from whence it passes through the medullary substance. This, like the other system, is founded altogether on hypothesis; but it seems to be an hypothesis derived from much more probable principles, and there are many ingenious arguments to be brought in its support.

Of the
Brain and
Nerves.

EXPLANATION OF PLATE XXIV.

FIG. 1. Represents the Inferior part of the Brain; —the Anterior part of the whole Spine, including the Medulla Spinalis; —with the origin and large portions of all the NERVES.

AA, The anterior lobes of the cerebrum. BB, The lateral lobes of the cerebrum. CC, The two lobes of the cerebellum. D, Tuber annulare. E, The passage from the third ventricle to the infundibulum. F, The medulla oblongata, which sends off the medulla spinalis through the spine. GG, That part of the os occipitis which is placed above (HH) the transverse processes of the first cervical vertebra. II, &c. The seven cervical vertebræ, with their intermediate cartilages. KK, &c. The twelve dorsal vertebræ, with their intermediate cartilages. LL, &c. The five lumbar vertebræ, with their intermediate cartilages. M, the os sacrum. N. The os coccygis.

NERVES.—1 1, The first pair of nerves named *olfactory*, which go to the nose. 2 2, The second pair, named *optic*, which goes to form the tunica retina of the eye. 3 3, The third pair, named *motor oculi*; it supplies most of the muscles of the eye-ball. 4 4, The fourth pair, named *pathetic*, —which is wholly spent upon the musculus trochlearis of the eye. 5 5, The fifth pair divides into three branches.—The first named *ophthalmic*, goes to the orbit, supplies the lachrymal gland, and sends branches out to the forehead and nose.—The second, named *superior maxillary*, supplies

the teeth of the upper jaw, and some of the muscles of the lips.—The third named *inferior maxillary*, is spent upon the muscles and teeth of the lower jaw, tongue, and muscles of the lips. 6 6, The sixth pair, which, after sending off the beginning of the intercostal or great sympathetic, is spent upon the abductor oculi. 7 7, The seventh pair, named *auditory*, divides into two branches.—The largest, named *portio mollis*, is spent upon the internal ear.—The smallest, *portio dura*, joins to the fifth pair within the internal ear by a reflected branch from the second of the fifth; and within the tympanum, by a branch from the third of the fifth, named *chorda tympani*.—Vid. fig. 3. near B. 8 8, &c. The eighth pair, named *par vagum*, —which accompanies the intercostal, and is spent upon the tongue, larynx, pharynx, lungs, and abdominal viscera. 9 9, The ninth pair, which are spent upon the tongue. 10 10, &c. The intercostal, or great sympathetic, which is seen from the sixth pair to the bottom of the pelvis on each side of the spine, and joining with all the nerves of the spine; —in its progress supplying the heart, and, with the par vagum, the contents of the abdomen and pelvis. 11 11, The accessorius, which is spent upon the sternocleido-mastoidæus and trapezius muscles. 12 12, The first cervical nerves; —13 13, The second cervical nerves; —both spent upon the muscles that lie on the neck, and teguments of the neck and head. 14 14, The third cervical nerves, which, after sending off (15 15, &c.) the phrenic nerves to the diaphragm, supply

Of the
Brain and
Nerves.

supply the muscles and teguments that lie on the side of the neck and top of the shoulder. 16 16, The brachial plexus, formed by the fourth, fifth, sixth, seventh cervicals, and first dorsal nerves,—which supply the muscles and teguments of the superior extremity. 17 17, The twelve dorsal, or proper intercostal nerves, which are spent upon the intercostal muscles and some of the large muscles which lie upon the thorax. 18 18, The five lumbar pairs of nerves, which supply the lumbar and abdominal muscles, and some of the teguments and muscles of the inferior extremity. 19 19, The sacro-sciatic, or posterior crural nerve, formed by the two inferior lumbar, and three superior of the os sacrum. This large nerve supplies the greatest part of the muscles and teguments of the inferior extremity. 20, The stomachic plexus, formed by the eighth pair. 21 21, Branches of the solar or celiac plexus, formed by the eighth pair and intercostals, which supply the stomach and chylopoietic viscera. 22 22, Branches of the superior and inferior mesenteric plexuses, formed by the eighth pair and interco-

stals, which supply the chylopoietic viscera, with part of the organs of urine and generation. 23 23, Nerves which accompany the spermatic cord. 24 24, The hypogastric plexus, which supplies the organs of urine and generation within the pelvis.

Fig. 2, 3, 4, 5. Show different Views of the Inferior part of the Brain, cut perpendicularly through the Middle,—with the Origin and large Portions of all the Nerves which pass out through the Bones of the Cranium,—and the three first Cervicals.

A, the anterior lobe. B, The lateral lobe of the cerebrum. C, One of the lobes of the cerebellum. D, Tuber annulare. E, Corpus pyramidale, in the middle of the medulla oblongata. F, The corpus olivare, in the side of the medulla oblongata. G, The medulla oblongata. H, The medulla spinalis.

NERVES.—1 2 3 4 5 6 7 8 and 9, Pairs of nerves. 10 10, Nervus accessorius, which comes from—11, 12, and 13, the three first cervical nerves.

PART VI. OF THE SENSES, AND THEIR ORGANS.

137. **I**N treating of the senses, we mean to confine ourselves to the external ones of *touch*, *taste*, *smelling*, *hearing*, and *vision*. The word *sense*, when applied to these five, seems to imply not only the sensation excited in the mind by certain impressions made on the body, but likewise the organ destined to receive and transmit these impressions to the sensorium. Each of these organs being of a peculiar structure, is susceptible only of particular impressions, which will be pointed out as we proceed to describe each of them separately.

SECT. I. Of Touch.

138. **T**HE sense of touch may be defined to be the faculty of distinguishing certain properties of bodies by the feel. In a general acceptation, this definition might perhaps not improperly be extended to every part of the body possessed of sensibility (τ), but it is commonly confined to the nervous papillæ of the cutis, or true skin, which with its appendages, and their several uses, have been already described.

The exterior properties of bodies, such as their so-

lidity, moisture, inequality, smoothness, dryness, or fluidity, and likewise their degree of heat, seem all to be capable of making different impressions on the papillæ, and consequently of exciting different ideas in the sensorium commune. But the organ of touch, like all the other senses, is not equally delicate in every part of the body, or in every subject; being in some much more exquisite than it is in others.

SECT. II. Of the Taste.

THE sense of taste is seated chiefly in the tongue; the situation and figure of which are sufficiently known.

On the upper surface of this organ we may observe a great number of papillæ, which, on account of their difference in size and shape, are commonly divided into three classes. The largest are situated towards the basis of the tongue. Their number commonly varies from seven to nine, and they seem to be mucous follicles. Those of the second class are somewhat smaller, and of a cylindrical shape. They are most numerous about the middle of the tongue. Those of the third class are very minute, and of a conical shape. They are

(τ) In the course of this article, mention has often been made of the sensibility or insensibility of different parts of the body: it will therefore, perhaps, not be amiss to observe in this place, that many parts which were formerly supposed to possess the most exquisite sense, are now known to have but little or no feeling, at least in a sound state; for in an inflamed state, even the bones, the most insensible parts of any, become susceptible of the most painful sensations. This curious discovery is due to the late Baron Haller. His experiments prove, that the bones, cartilages, ligaments, tendons, epidermis, and membranes, (as the pleura, pericardium, dura and pia mater, periosteum, &c.), may in a healthy state be considered as insensible. As sensibility depends on the brain and nerves, of course different parts will possess a greater or less degree of feeling, in proportion as they are supplied with a greater or smaller number of nerves. Upon this principle it is, that the skin, muscles, stomach, intestines, urinary bladder, ureters, uterus, vagina, penis, tongue, and retina, are extremely sensible, while the lungs and glands have only an obscure degree of feeling.

Fig. 1.

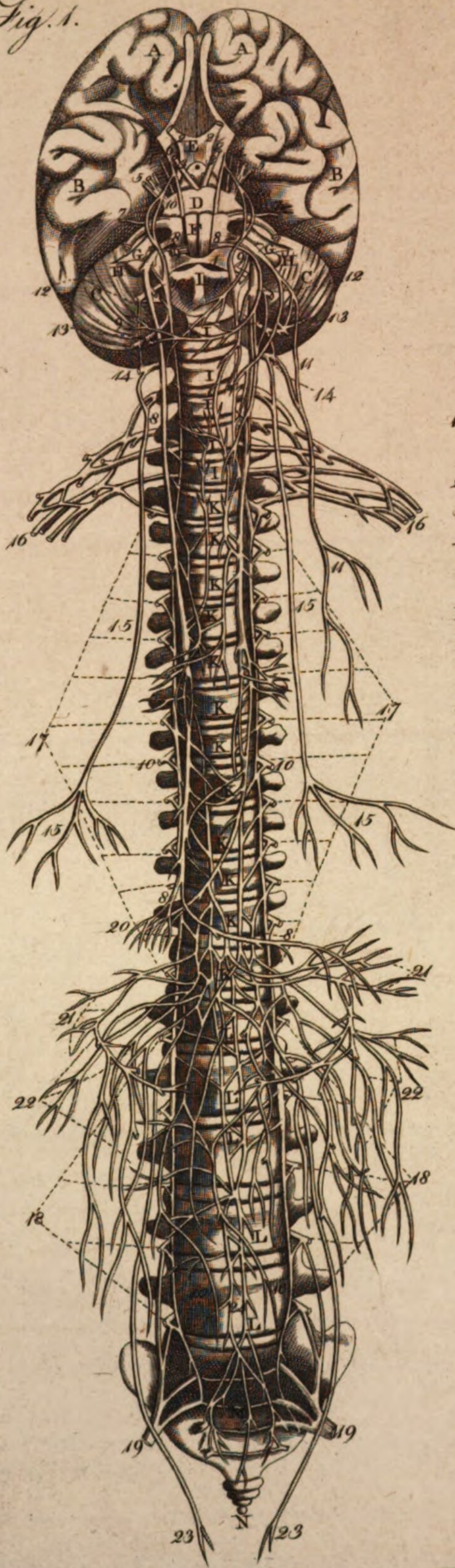


Fig. 2.



Fig. 3.



Fig. 4.

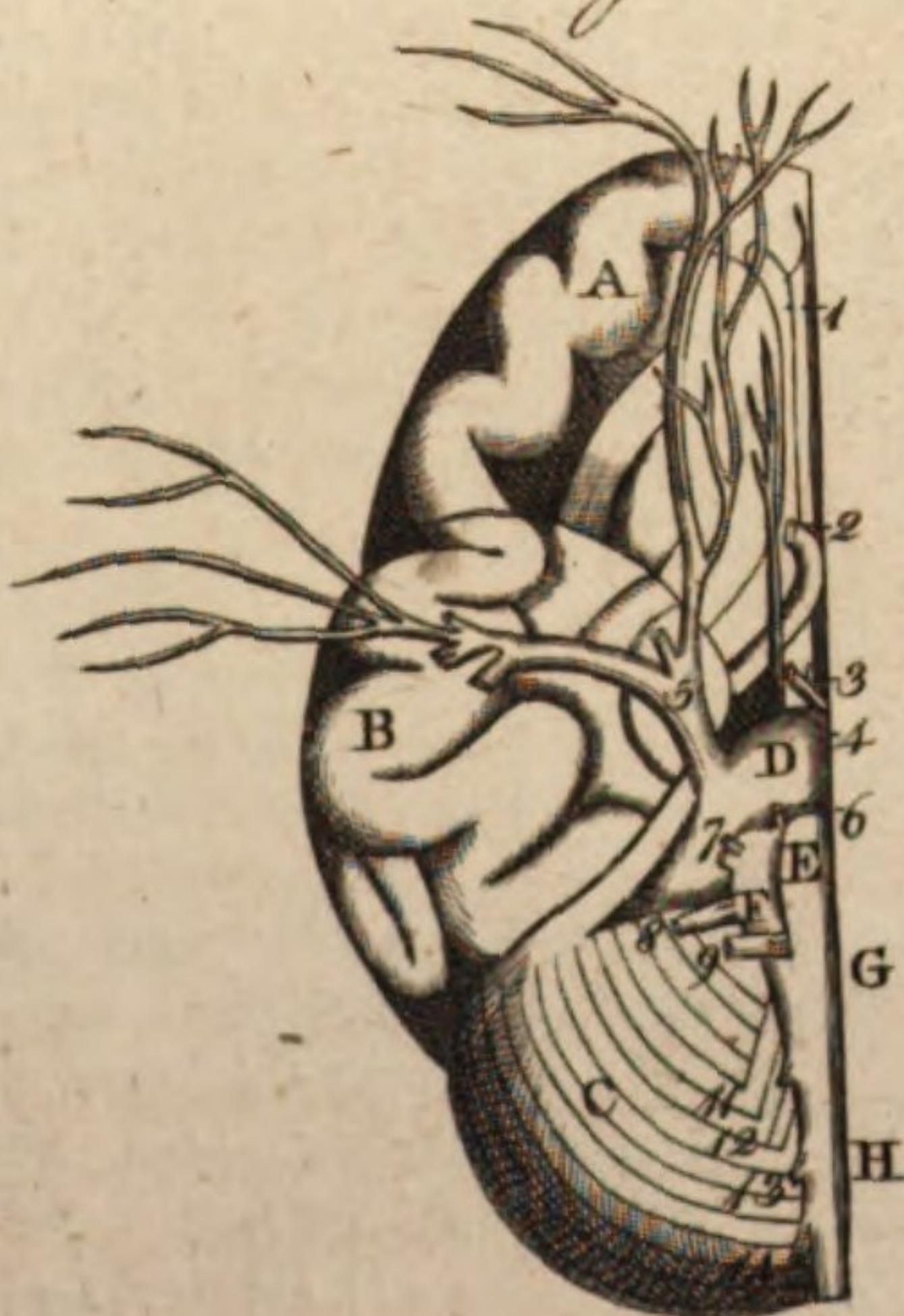
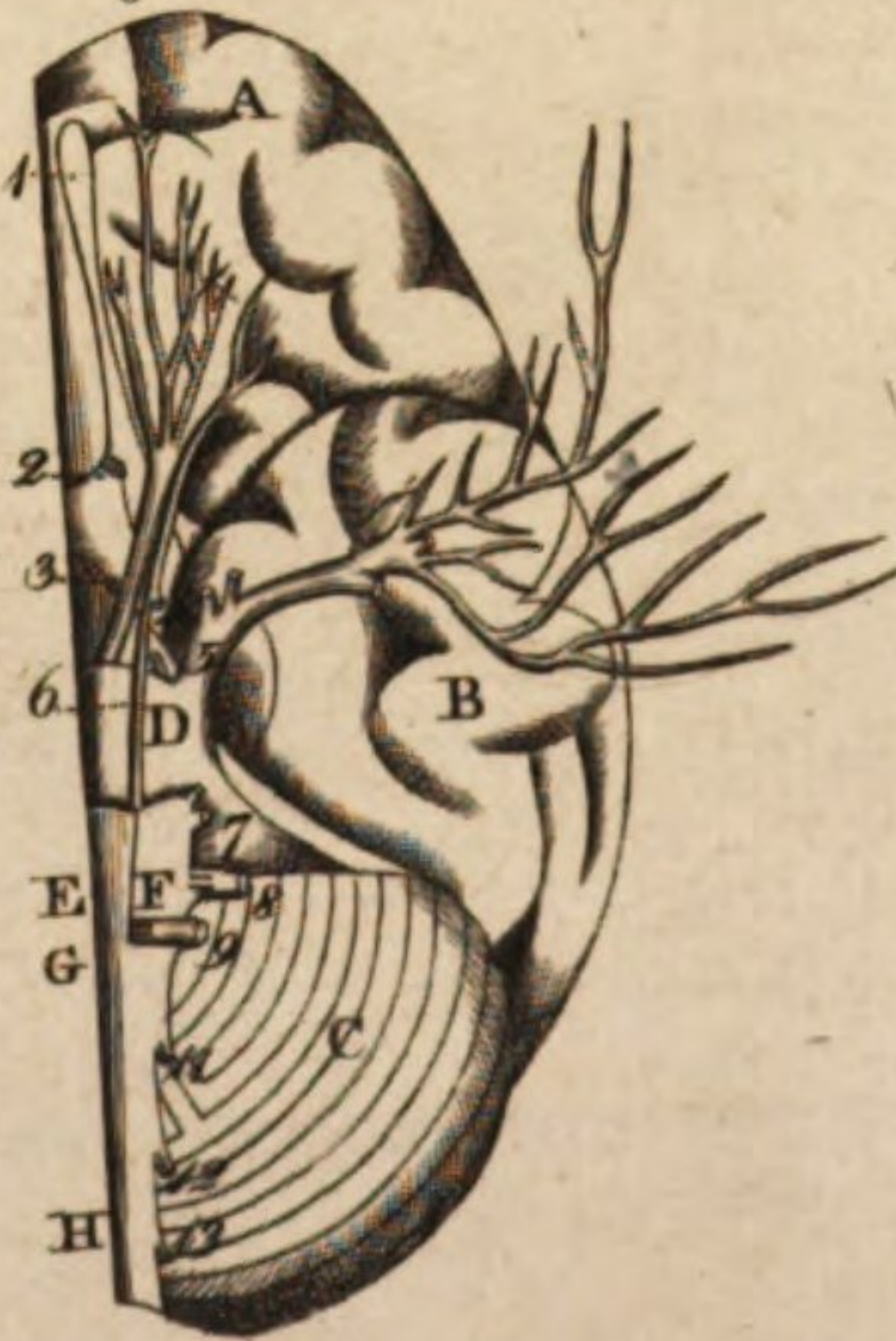


Fig. 5.



Of the
Senses.

are very numerous on the apex and edges of the tongue, and have been supposed to be formed by the extremities of its nerves.

We observe a line, the *linea linguae mediana*, running along the middle of the tongue, and dividing it as it were into two portions. Towards the basis of the tongue, we meet with a little cavity, named by Morgagni *foramen caecum*, which seems to be nothing more than a common termination of some of the excretory ducts of mucous glands situated within the substance of the tongue.

We have already observed, that this organ is every where covered by the cuticle, which, by forming a reduplication, called the *frænum*, at its under part, serves to prevent the too great motion of the tongue, and to fix it in its situation. But, besides this attachment, the tongue is connected by means of its muscles and membranous ligaments, to the lower jaw, the os hyoides, and the styloid processes.

The principal arteries of the tongue are the linguales, which arise from the external carotid. Its veins empty themselves into the external jugulars. Its nerves arise from the fifth, eighth, and ninth, pair.

The variety of tastes seems to be occasioned by the different impressions made on the papillæ by the food. The different state of the papillæ with respect to their moisture, their figure, or their covering, seems to produce a considerable difference in the taste, not only in different people, but in the same subject, in sickness and in health. The great use of the taste seems to be to enable us to distinguish wholesome and salutary food from that which is unhealthy; and we observe that many quadrupeds, having their papillæ (u) very large and long, have the faculty of distinguishing flavour with infinite accuracy.

SECT. III. Of Smelling.

140 .

THE sense of smelling, like the sense of taste, seems intended to direct us to a proper choice of aliment, and is chiefly seated in the nose, which is distinguished into its external and internal parts. The situation and figure of the former of these do not seem to require a definition. It is composed of bones and cartilages, covered by muscular fibres and by the common integuments. The bones make up the upper portion, and the cartilages the lower one. The septum narium, like the nose, is likewise in part bony, and in part cartilaginous. These bones and their connections were described in the osteology.

The internal part of the nose, besides the ossa spongiosa, has six cavities or sinuses, the maxillary, the frontal, and the sphenoid, which were all described with the bones of the head. They all open into the nostrils; and the nose likewise communicates with the mouth, larynx, and pharynx, posteriorly behind the velum palati.

All these several parts, which are included in the internal division of the nose, viz. the inner surface of the nostrils, the lamellæ of the ossa spongiosa and the sinu-

ses, are lined by a thick and very vascular membrane, which, though not unknown to the ancients, was first well described by Schneider *, and is therefore now commonly named *membrana pituitaria Schneideri*. This membrane is truly the organ of smelling; but its real structure does not yet seem to be perfectly understood. It appears to be a continuation of the cuticle, which lines the inner surface of the mouth. In some parts of the nose it is smooth and firm, and in others it is loose and spongy. It is constantly moistened by a mucous secretion; the finer parts of which are carried off by the air we breathe, and the remainder, by being retained in the sinuses, acquires considerable consistence. The manner in which this mucus is secreted has not yet been satisfactorily ascertained; but it seems to be by means of mucous follicles.

Its arteries are branches of the internal maxillary and internal carotid. Its veins empty themselves into the internal jugulars. The first pair of nerves, the olfactory, are spread over every part of it, and it likewise receives branches from the fifth pair.

After what has been said of the pituitary membrane, it will not be difficult to conceive how the air we draw in at the nostrils, being impregnated with the effluvia of bodies, excites in us that kind of sensation we call *smelling*. As these effluvia, from their being exceedingly light and volatile, cannot be capable in a small quantity of making any great impression on the extremities of the olfactory nerves, it was necessary to give considerable extent to the pituitary membrane, that by this means a greater number of odoriferous particles might be admitted at the same time. When we wish to take in much of the effluvia of any thing, we naturally close the mouth, that all the air we inspire may pass through the nostrils; and at the same time, by means of the muscles of the nose, the nostrils are dilated, and a greater quantity of air is drawn into them.

In many quadrupeds, the sense of smelling is much more extensive and delicate than it is in the human subject; and in the human subject it seems to be more perfect the less it is vitiated by a variety of smells. It is not always in the same state of perfection, being naturally affected by every change of the pituitary membrane, and of the lymph with which that membrane is moistened.

SECT. IV. Of Hearing.

Before we undertake to explain the manner in which we are enabled to receive the impressions of sound, it will be necessary to describe the ear, which is the *organ of hearing*. It is commonly distinguished into external and internal. The former of these divisions includes all that we are able to discover without dissection, and the meatus auditorius, as far as the tympanum; and the latter, all the other parts of the ear.

The *external ear* is a cartilaginous funnel, covered by the common integuments, and attached, by means of its ligaments and muscles, to the temporal bone. Although capable only of a very obscure motion, it is

S D 2

found

(u) Malpighi's description of the papillæ, which has been copied by many anatomical writers, seems to have been taken chiefly from the tongues of sheep.

Of the
Senses.* De Ca-
tarro, lib.

iii.

141

found to have several muscles. Different parts of it are distinguished by different names; all its cartilaginous part is called *ala* or *wing*, to distinguish it from the soft and pendent part below, called the *lobe*. Its outer circle or border is called *helix*, and the semicircle within this, *antihelix*. The moveable cartilage placed immediately before the meatus auditorius, which it may be made to close exactly, is named *tragus*; and an eminence opposite to this at the extremity of the antihelix, is called *antitragus*. The concha is a considerable cavity formed by the extremities of the helix and antihelix. The meatus auditorius, which at its opening is cartilaginous, is lined with a very thin membrane, which is a continuation of the cuticle from the surface of the ear.

In this canal we find a yellow wax, which is secreted by a number of minute glands or follicles, each of which has an excretory duct. This secretion, which is at first of an oily consistence, defends the membrane of the tympanum from the injuries of the air; and by its bitterness, prevents minute insects from entering into the ear. But when from neglect or disease it accumulates in too great a quantity, it sometimes occasions deafness. The inner extremity of the meatus is closed by a very thin transparent membrane, the membrana tympani, which is set in a bony circle like the head of a drum. In the last century Rivinus, professor at Leipzig, fancied he had discovered a hole in this membrane, surrounded by a sphincter, and affording a passage to the air, between the external and internal ear. Cowper, Heister, and some other anatomists, have admitted this supposed foramen, which certainly does not exist. Whenever there is any opening in the membrana tympani, it may be considered as accidental. Under the membrana tympani runs a branch of the fifth pair of nerves, called *chorda tympani*; and beyond this membrane is the cavity of the tympanum, which is about seven or eight lines wide, and half so many in depth; it is semispherical, and every where lined by a very fine membrane. There are four openings to be observed in this cavity. It communicates with the mouth by means of the Eustachian tube. This canal, which is in part bony and in part cartilaginous, begins by a very narrow opening at the anterior and almost superior part of the tympanum, increasing in size as it advances towards the palate of the mouth, where it terminates by an oval opening. This tube is every where lined by the same membrane that covers the inside of the mouth. The real use of this canal does not seem to have been hitherto satisfactorily ascertained; but sound would seem to be conveyed through it to the membrana tympani, deaf persons being often observed to listen attentively with their mouths open. Opposite to this is a minute passage, which leads to the sinuosities of the mastoid process; and the two other openings, which are in the internal process of the os petrosum, are the fenestra ovalis, and fenestra rotunda, both of which are covered by a very fine membrane.

There are three distinct bones in the cavity of the tympanum; and these are the malleus, incus, and stapes.

Besides these there is a fourth, which is the *os orbiculare*. Of the *larynx*, considered by some anatomists as a process of the stapes, which is necessarily broken off by the violence we are obliged to use in getting at these bones; but when accurately considered, it seems to be a distinct bone.

The *malleus* is supposed to resemble a hammer, being larger at one extremity, which is its head, than it is at the other, which is its handle. The latter is attached to the membrana tympani, and the head of the bone is articulated with the incus.

The *incus*, as it is called from its shape, though it seems to have less resemblance to an anvil than to one of the dentes molares with its roots widely separated from each other, is distinguished into its body and its legs. One of its legs is placed at the entry of the canal which leads to the mastoid process; and the other, which is somewhat longer, is articulated with the stapes, or rather with the os orbiculare, which is placed between them.

The third bone is very properly named *stapes*, being perfectly shaped like a stirrup. Its basis is fixed into the fenestra ovalis, and its upper part is articulated with the os orbiculare. What is called the *fenestra rotunda*, though perhaps improperly, as it is more oval than round, is observed a little above the other, in an eminence formed by the os petrosum, and is closed by a continuation of the membrane that lines the inner surface of the tympanum. The stapes and malleus are each of them furnished with a little muscle, the stapedeus and tensor tympani. The first of these, which is the smallest in the body, arises from a little cavern in the posterior and upper part of the cavity of the tympanum; and its tendon, after passing through a hole in the same cavern, is inserted at the back part of the head of the stapes. This muscle, by drawing the stapes obliquely upwards, assists in stretching the membrana tympani.

The tensor tympani (x), or internus mallei as it is called by some writers, arises from the cartilaginous extremity of the Eustachian tube, and is inserted into the back part of the handle of the malleus, which it serves to pull inwards, and of course helps to stretch the membrana tympani.

The labyrinth is the only part of the ear which remains to be described. It is situated in the os petrosum, and is separated from the tympanum by a partition which is every where bony, except at the two fenestrae. It is composed of three parts; and these are the vestibulum, the semicircular canals, and the cochlea.

The *vestibulum* is an irregular cavity, much smaller than the tympanum, situated nearly in the centre of the os petrosum, between the tympanum, the cochlea, and the semicircular canals. It is open on the side of the tympanum by means of the fenestra ovalis, and communicates with the upper portion of the cochlea by an oblong foramen, which is under the fenestra ovalis, from which it is separated only by a very thin partition.

Each of the three *semicircular canals* forms about half

(x) Some anatomists describe three muscles of the malleus; but only this one seems to deserve the name of muscle; what are called the *externus* and *obliquus mallei*, seeming to be ligaments rather than muscles.

Of the
Senses.

half a circle of nearly a line in diameter, and running each in a different direction, they are distinguished into *vertical*, *oblique*, and *horizontal*. These three canals open by both their extremities into the vestibulum; but the vertical and the oblique being united together at one of their extremities, there are only five orifices to be seen in the vestibulum.

The *cochlea* is a canal which takes a spiral course, not unlike the shell of a snail. From its basis to its apex it makes two turns and a half; and is divided into two canals by a very thin lamina or septum, which is in part bony and in part membranous, in such a manner that these two canals only communicate with each other at the point. One of them opens into the vestibulum, and the other is covered by the membrane that closes the fenestra rotunda. The bony lamella which separates the two canals is exceedingly thin, and fills about two thirds of the diameter of the canal. The rest of the septum is composed of a most delicate membrane, which lines the whole inner surface of the cochlea, and seems to form this division in the same manner as the two membranous bags of the pleura, by being applied to each other, form the mediastinum.

Every part of the labyrinth is furnished with a very delicate periostrum, and filled with a watry fluid, secreted as in other cavities. This fluid transmits to the nerves the vibrations it receives from the membrane closing the fenestra rotunda, and from the basis of the stapes, where it rests on the fenestrum ovale. When this fluid it collected in too great a quantity, or is compressed by the stapes, it is supposed to escape through two minute canals or aqueducts, lately described by Dr Cotunni *, an ingenious physician at Naples. One of these aqueducts opens into the bottom of the vestibulum, and the other into the cochlea, near the fenestra rotunda. They both pass through the os petrosum, and communicate with the cavity of the cranium where the fluid that passes through them is absorbed; and they are lined by a membrane which is supposed to be a production of the dura mater.

The arteries of the external ear come from the temporal and other branches of the external carotid, and its veins pass into the jugular. The internal ear receives branches of arteries from the basilar and carotids, and its veins empty themselves into the sinuses of the dura mater, and into the internal jugular.

The portio mollis of the seventh pair is distributed through the cochlea, the vestibulum, and the semicircular canals; and the portio dura sends off a branch to the tympanum, and other branches to the external ear and parts near it.

The *sense of hearing*, in producing which all the parts we have described assist, is occasioned by a certain modulation of the air collected by the funnel-like shape of the external ear, and conveyed through the meatus auditorius to the membrana tympani. That sound is propagated by means of the air, is very easily proved by ringing a bell under the receiver of an air-pump; the sound it affords being found to diminish

gradually as the air becomes exhausted, till at length it ceases to be heard at all. Sound moves through the air with infinite velocity; but the degree of its motion seems to depend on the state of the air, as it constantly moves faster in a dense and dry, than it does in a moist and rarified air. See *Acoustics*, n^o 20.

That the air vibrating on the membrana tympani communicates its vibration to the different parts of the labyrinth, and by means of the fluid contained in this cavity affects the auditory nerve so as to produce sound, seems to be very probable; but the situation, the minuteness, and the variety of the parts which compose the ear, do not permit much to be advanced with certainty concerning their mode of action.

Some of these parts seem to constitute the immediate organ of hearing, and these are all the parts of the vestibulum: but there are others which seem intended for the perfection of this sense, without being absolutely essential to it. It has happened, for instance, that the membrana tympani, and the little bones of the ear, have been destroyed by disease, without depriving the patient of the sense of hearing (v).

Sound is more or less loud in proportion to the strength of the vibration; and the variety of sounds seems to depend on the difference of this vibration; for the more quick and frequent it is, the more acute will be the sound, and *vice versa*.

Before we conclude this article, it will be right to explain certain phenomena, which will be found to have a relation to the organ of hearing.

Every body has, in consequence of particular sounds, occasionally felt that disagreeable sensation which is usually called *setting the teeth on edge*: and the cause of this sensation may be traced to the communication which the portio dura of the auditory nerve has with the branches of the fifth pair that are distributed to the teeth, being probably occasioned by the violent tremor produced in the membrana tympani by these very acute sounds. Upon the same principle we may explain the strong idea of sound which a person has who holds a vibrating string between his teeth.

The humming which is sometimes perceived in the ear, without any exterior cause, may be occasioned either by an increased action of the arteries in the ears, or by convulsive contractions of the muscles of the malleus and stapes, affecting the auditory nerve in such a manner as to produce the idea of sound. An ingenious philosophical writer * has lately discovered, that there are sounds liable to be excited in the ear by irritation, and without any assistance from the vibrations of the air.

SECT. V. Of Vision †.

THE eyes, which constitute the organ of vision, are situated in two bony cavities named *orbits*, where they are surrounded by several parts, which are either intended to protect them from external injury, or to assist in their motion.

The

* *De aqueductibus Auris Humanae Internae*, 8vo 1760.

* *Elliot's Philosophical Observations on the Senses of Vision and Hearing*, 8vo. † See *Optics*. 142.

(v) This observation has led to a supposition, that a perforation of this membrane may in some cases of deafness be useful; and Mr Cheselden relates, that, some years ago, a malefactor was pardoned on condition that he would submit to this operation; but the public clamour raised against it was so great, that it was thought right not to perform it.

Of the
Senses.

The globe of the eye is immediately covered by two eye-lids or palpebræ, which are composed of muscular fibres covered by the common integuments, and lined by a very fine and smooth membrane, which is from thence extended over part of the globe of the eye, and is called *tunica conjunctiva*. Each eye-lid is cartilaginous at its edge; and this border, which is called *tarsus*, is furnished with a row of hairs named *cilia* or *eye-lashes*.

The cilia serve to protect the eye from insects and minute bodies floating in the air, and likewise to moderate the action of the rays of light in their passage to the retina. At the roots of these hairs there are sebaceous follicles, first noticed by Meibomius, which discharge a glutinous liniment. Sometimes the fluid they secrete has too much viscosity, and the eye-lids become glued to each other.

The upper border of the orbit is covered by the eye-brows or supercilia, which by means of their two muscles are capable of being brought towards each other, or of being carried upwards. They have been considered as serving to protect the eyes, but they are probably intended more for ornament than utility (z).

The orbits, in which the eyes are placed, are furnished with a good deal of fat, which affords a soft bed on which the eye performs its several motions. The inner angle of each orbit, or that part of it which is near the nose, is called *canthus major*, or the *great angle*; and the outer angle, which is on the opposite side of the eye, is the *canthus minor*, or *little angle*.

The little reddish body which we observe in the great angle of the eye-lids, and which is called *caruncula lachrymalis*, is supposed to be of a glandular structure, and like the follicles of the eye-lids, to secrete an oily humour. But its structure and use do not seem to have been hitherto accurately determined. The surface of the eye is constantly moistened by a very fine limpid fluid called the *tears*, which is chiefly, and perhaps wholly, derived from a large gland of the conglomerate kind, situated in a small depression of the os frontis near the outer angle of the eye. Its excretory ducts pierce the tunica conjunctiva just above the cartilaginous borders of the upper eye-lids. When the tears were supposed to be secreted by the caruncle, this gland was called *glandula innominata*; but now that its structure and uses are ascertained, it very properly has the name of *glandula lachrymalis*. The tears poured out by the ducts of this gland are, in a natural and healthy state, incessantly spread over the surface of the eye, to keep it clear and transparent, by means of the eye-lids, and as constantly pass out at the opposite corner of the eye, or inner angle, through two minute orifices, the puncta lachrymalia (A); being determined into these little openings by a reduplication of the tunica conjunctiva, shaped like a crescent, the two points

of which answer to the puncta. This reduplication is named *membrana*, or *valvula semilunaris*. Each of these puncta is the beginning of a small excretory tube, through which the tears pass into a little pouch or reservoir, the sacculus lachrymalis, which lies in an excavation formed partly by the nasal process of the os maxillare superius, and partly by the os unguis. The lower part of this sac forms a duct called the *ductus ad nares*, which is continued through a bony channel, and opens into the nose, through which the tears are occasionally discharged (B).

The motions of the eye are performed by six muscles; four of which are straight and two oblique. The straight muscles are distinguished by the names of *elevator*, *depressor*, *adductor*, and *abductor*, from their several uses in elevating and depressing the eye, drawing it towards the nose, or carrying it from the nose towards the temple. All these four muscles arise from the bottom of the orbit, and are inserted by flat tendons into the globe of the eye. The oblique muscles are intended for the more compound motions of the eye. The first of these muscles, the obliquus superior, does not, like the other four muscles we have described, arise from the bottom of the orbit, but from the edge of the foramen that transmits the optic nerve, which separates the origin of this muscle from that of the others. From this beginning it passes in a straight line towards a very small cartilaginous ring, the situation of which is marked in the skeleton by a little hollow in the internal orbital process of the os frontis. The tendon of the muscle, after passing through this ring, is inserted into the upper part of the globe of the eye, which it serves to draw forwards, at the same time turning the pupil downwards.

The obliquus inferior arises from the edge of the orbit, under the opening of the ductus lachrymalis; and is inserted somewhat posteriorly into the outer side of the globe, serving to draw the eye forwards and turn the pupil upwards. When either of these two muscles acts separately, the eye is moved on its axis; but when they act together, it is compressed both above and below. The eye itself, which is now to be described, with its tunics, humours, and component parts, is nearly of a spherical figure. Of its tunics, the conjunctiva has been already described as a partial covering, reflected from the inner surface of the eye-lids over the anterior portion of the eye. What has been named *albuginea* cannot properly be considered as a coat of the eye, being in fact nothing more than the tendons of the straight muscles spread over some parts of the sclerotica.

The immediate tunics of the eye, which are to be demonstrated when its partial coverings, and all the other parts with which it is surrounded, are removed, are the sclerotica, cornea, choroides, and retina.

The *sclerotica*, which is the exterior coat, is every where

(z) It is observable, that the eye-brows are peculiar to the human species.

(A) It sometimes happens, that this very pellucid fluid, which moistens the eye, being poured out through the excretory ducts of the lachrymal gland faster than it can be carried off through the puncta, trickles down the cheek, and is then strictly and properly called *tears*.

(B) When the ductus ad nares becomes obstructed in consequence of disease, the tears are no longer able to pass into the nostrils; the sacculus lachrymalis becomes distended; and inflammation, and sometimes ulceration, taking place, constitute the disease called *fistula lachrymalis*.

Of the
Senses.

Of the
Senses.

where white and opaque, and is joined at its anterior edge to another, which has more convexity than any other part of the globe, and being exceedingly transparent, is called *cornea* (c). These two parts are perfectly different in their structure; so that some anatomists suppose them to be as distinct from each other as the glass of a watch is from the case into which it is fixed. The *sclerotica* is of a compact fibrous structure; the *cornea*, on the other hand, is composed of a great number of laminae united by a cellular membrane. By macerating them in boiling water, they do not separate from each other, as some writers have asserted; but the *cornea* soon softens, and becomes of a glutinous consistence.

The ancients supposed the *sclerotica* to be a continuation of the *dura mater*. Morgagni and some other modern writers are of the same opinion; but this point is disputed by Winslow, Haller, Zinn, and others. The truth seems to be, that the *sclerotica*, though not a production of the *dura mater*, adheres intimately to that membrane.

The *choroides* is so called because it is furnished with a great number of vessels. It has likewise been named *avea*, on account of its resemblance to a grape. Many modern anatomical writers have considered it as a production of the *pia mater*. This was likewise the opinion of the ancients; but the strength and thickness of the *choroides*, when compared with the delicate structure of the *pia mater*, are sufficient proofs of their being two distinct membranes.

The *choroides* has of late generally been described as consisting of two laminae; the innermost of which has been named after Ruysch, who first described it. It is certain, however, that Ruysch's distinction is ill founded, at least with respect to the human eye, in which we are unable to demonstrate any such structure, although the *tunica choroides* of sheep and some other quadrupeds may easily be separated into two layers.

The *choroides* adheres intimately to the *sclerotica* round the edge of the *cornea*; and at the place of this union we may observe a little whitish areola, named *ligamentum ciliare*, though it is not of a ligamentous nature.

They who suppose the *choroides* to be composed of two laminae, describe the external one as terminating in the *ligamentum ciliare*, and the internal one as extending farther to form the *iris*, which is the circle we are able to distinguish through the *cornea*: but this part is of a very different structure from the *choroides*; so that some late writers have perhaps not improperly considered the *iris* as a distinct membrane. It derives its name from the variety of its colours, and is perforated in its middle. This perforation, which is called the *pupil* or *sight* of the eye, is closed in the foetus by

a very thin vascular membrane. This *membrana pupillaris* commonly disappears about the seventh month.

On the under side of the *iris* we observe many minute fibres, called *ciliary processes*, which pass in radii or parallel lines from the circumference to the centre. The contraction and dilatation of the pupil are supposed to depend on the action of these processes. Some have considered them as muscular, but they are not of an irritable nature; others have supposed them to be filaments of nerves: but their real structure has never yet been clearly ascertained.

Besides these *ciliary processes*, anatomists usually speak of the circular fibres of the *iris*, but no such seem to exist.

The posterior surface of the *iris*, the *ciliary processes*, and part of the *tunica choroides*, are covered by a black mucus for the purposes of accurate and distinct vision; but the manner in which it is secreted, has not been determined.

Immediately under the *tunica choroides* we find the third and inner coat, called the *retina*, which seems to be merely an expansion of the pulpy substance of the optic nerve, extending to the borders of the crystalline humour.

The greatest part of the globe of the eye, within these several tunics, is filled by a very transparent and gelatinous humour of considerable consistence, which, from its supposed resemblance to fused glass, is called the *vitreous humour*. It is invested by a very fine and delicate membrane, called *tunica vitrea*, and sometimes *arachnoides*.—It is supposed to be composed of two laminae; one of which dips into its substance, and by dividing the humour into cells adds to its firmness. The fore-part of the *vitreous humour* is a little hollowed, to receive a very white and transparent substance of a firm texture, and of a lenticular and somewhat convex shape, named the *crystalline humour*. It is included in a capsula, which seems to be formed by a separation of the two laminae of the *tunica vitrea*.

The fore-part of the eye is filled by a very thin and transparent fluid, named the *aqueous humour*, which occupies all the space between the crystalline and the prominent *cornea*.—That part of the *choroides* which is called the *iris*, and which comes forward to form the pupil, appears to be suspended as it were in this humour, and has occasioned this portion of the eye to be distinguished into two parts. One of these, which is the little space between the anterior surface of the crystalline and the *iris*, is called the *posterior chamber*; and the other, which is the space between the *iris* and the *cornea*, is called the *anterior chamber* of the eye (D). Both these spaces are completely filled with the aqueous humour (E).

The eye receives its arteries from the internal carotid.

(c) Some writers, who have given the name of *cornea* to all this outer coat, have named what is here and most commonly called *sclerotica*, *cornea opaca*; and its anterior and transparent portion, *cornea lucida*.

(D) I am aware that some anatomists, particularly Lieutaud, are of opinion, that the *iris* is every where in close contact with the crystalline, and that it is of course right to speak only of one chamber of the eye; but as this does not appear to be the case, the situation of the *iris* and the two chambers of the eye are here described in the usual way.

(E) When the crystalline becomes opaque, so as to prevent the passage of the rays of light to the retina, it constitutes what is called a *cataract*; and the operation of couching consists in removing the diseased crystalline from

Of the
Senses.

tid, through the foramina optica; and its veins pass through the foramina lacera, and empty themselves into the lateral sinuses. Some of the ramifications of these vessels appear on the inner surface of the iris, where they are seen to make very minute convolutions, which are sufficiently remarkable to be distinguished by the name of *circulus arteriosus*, though perhaps improperly, as they are chiefly branches of veins.

The optic nerve passes in at the posterior part of the eye, in a considerable trunk, to be expanded for the purposes of vision, of which it is now universally supposed to be the immediate seat. But Messrs Mariotte and Mery contended, that the choroides is the seat of this sense; and the ancients supposed the crystalline to be so. Besides the optic, the eye receives branches from the third, fourth, fifth, and sixth pair of nerves.

The humours of the eye, together with the cornea, are calculated to refract and converge the rays of light in such a manner as to form at the bottom of the eye a distinct image of the object we look at; and the point where these rays meet is called the *focus* of the eye. On the retina, as in a *camera obscura*, the object is painted in an inverted position; and it is only by habit that we are enabled to judge of its true situation, and likewise of its distance and magnitude.

To a young gentleman who was born blind, and who was couched by Mr Cheselden, every object (as he expressed himself) seemed to touch his eyes as what he felt did his skin; and he thought no objects so agreeable as those which were smooth and regular, although for some time he could form no judgment of their shape, or guess what it was in any of them that was pleasing to him.

In order to paint objects distinctly on the retina, the cornea is required to have such a degree of convexity, that the rays of light may be collected at a certain point, so as to terminate exactly on the retina.—If the cornea is too prominent, the rays, by diverging too soon, will be united before they reach the retina, as is the case with near-sighted people or *myopes*; and on the contrary, if it is not sufficiently convex, the rays will not be perfectly united when they reach the back-part of the eye; and this happens to long-sighted people or *presbi*, being found constantly to take place as we approach to old age, when the eye gradually flattens (F). These defects are to be supplied by means of glasses. He who has too prominent an eye, will find his vision improved by means of a concave glass; and upon the same principles, a convex glass will be found useful to a person whose eye is naturally too flat.

EXPLANATION OF PLATE XXVII.

FIGURE 1. Shows the Lachrymal Canals, after the Common Teguments and Bones have been cut away.

a, The lachrymal gland. b, the two puncta lachrymalia, from which the two lachrymal canals proceed to c, the lachrymal sac. d, The large lachrymal duct. e, Its opening into the nose. f, The caruncula lachrymalis. g, The eye-ball.

FIG. 2. An interior view of the Coats and Humours of the Eye.

a a a a, The tunica sclerotica cut in four angles, and turned back. b b b b, The tunica choroides adhering to the inside of the sclerotica, and the ciliary vessels are seen passing over.—c c, The retina, which covers the vitreous humour. d d, The ciliary processes, which were continued from the choroid coat. e e, The iris. f, The pupil.

FIG. 3. Shows the Optic Nerves, and Muscles of the Eye.

a a, The two optic nerves before they meet. b, The two optic nerves conjoined. c, The right optic nerve. d, Musculus attollens palpebræ superioris. e, Attollens oculi. f, Abductor. g g, Obliquus superior, or trochlearis. h, Adductor. i, The eye-ball.

FIG. 4. Shows the Eye-ball with its Muscles.

a, The optic nerve. b, Musculus trochlearis. c, Part of the os frontis, to which the trochlea or pulley is fixed, through which—d, The tendons of the trochlearis passes. e, Attollens oculi. f, Adductor oculi. g, Abductor oculi. h, Obliquus inferior. i, Part of

No. 20.

the superior maxillary bone to which it is fixed. k, The eye-ball.

FIG. 5. Represents the Nerves and Muscles of the Right eye, after part of the Bones of the Orbit have been cut away.

A, The eye-ball. B, The lachrymal gland. C, Musculus abductor oculi. D, Attollens. E, Levator palpebræ superioris. F, Depressor oculi. G, Adductor. H, Obliquus superior, with its pulley. I, Its insertion into the sclerotic coat. K, part of the obliquus inferior. L, The anterior part of the os frontis cut. M, The crista galli of the ethmoid bone. N, The posterior part of the sphenoid bone. O, Transverse spinous process of the sphenoid bone. P, The carotid artery, denuded where it passes through the bones. Q, The carotid artery within the cranium. R, The ocular artery.

NERVES.—a a, The optic nerve. b, The third pair.—c, Its joining with a branch of the first branch of the fifth pair, to form l, the lenticular ganglion, which sends off the ciliary nerves, d. e e, The fourth pair. f, The trunk of the fifth pair. g, The first branch of the fifth pair, named ophthalmic.—h, The frontal branch of it. i, Its ciliary branches, along with which the nasal twig is sent to the nose. k, Its branches to the lachrymal gland. l, The lenticular ganglion. m, The second branch of the fifth pair, named superior maxillary. n, The third branch of the fifth pair, named inferior maxillary. o, The sixth pair of

3

from its bed in the vitreous humour. In this operation the cornea is perforated, and the aqueous humour escapes out of the eye, but it is constantly renewed again in a very short time. The manner however in which it is secreted, has not yet been determined.

(F) Upon this principle, they who in their youth are near-sighted may expect to see better as they advance in life, as their eyes gradually become more flat.

Fig. 1.

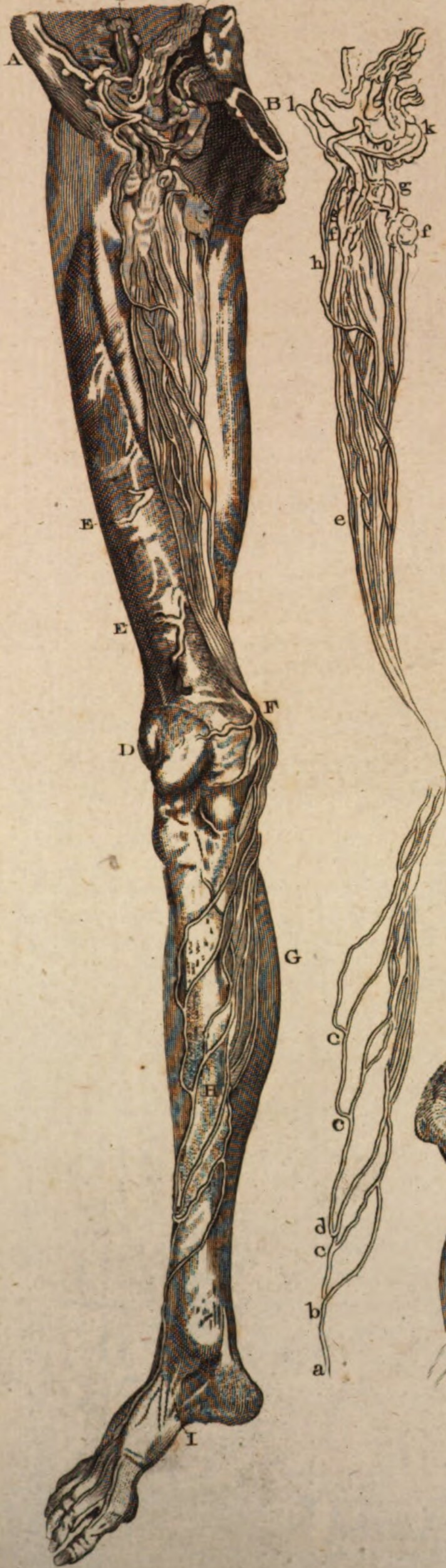


Fig. 3.

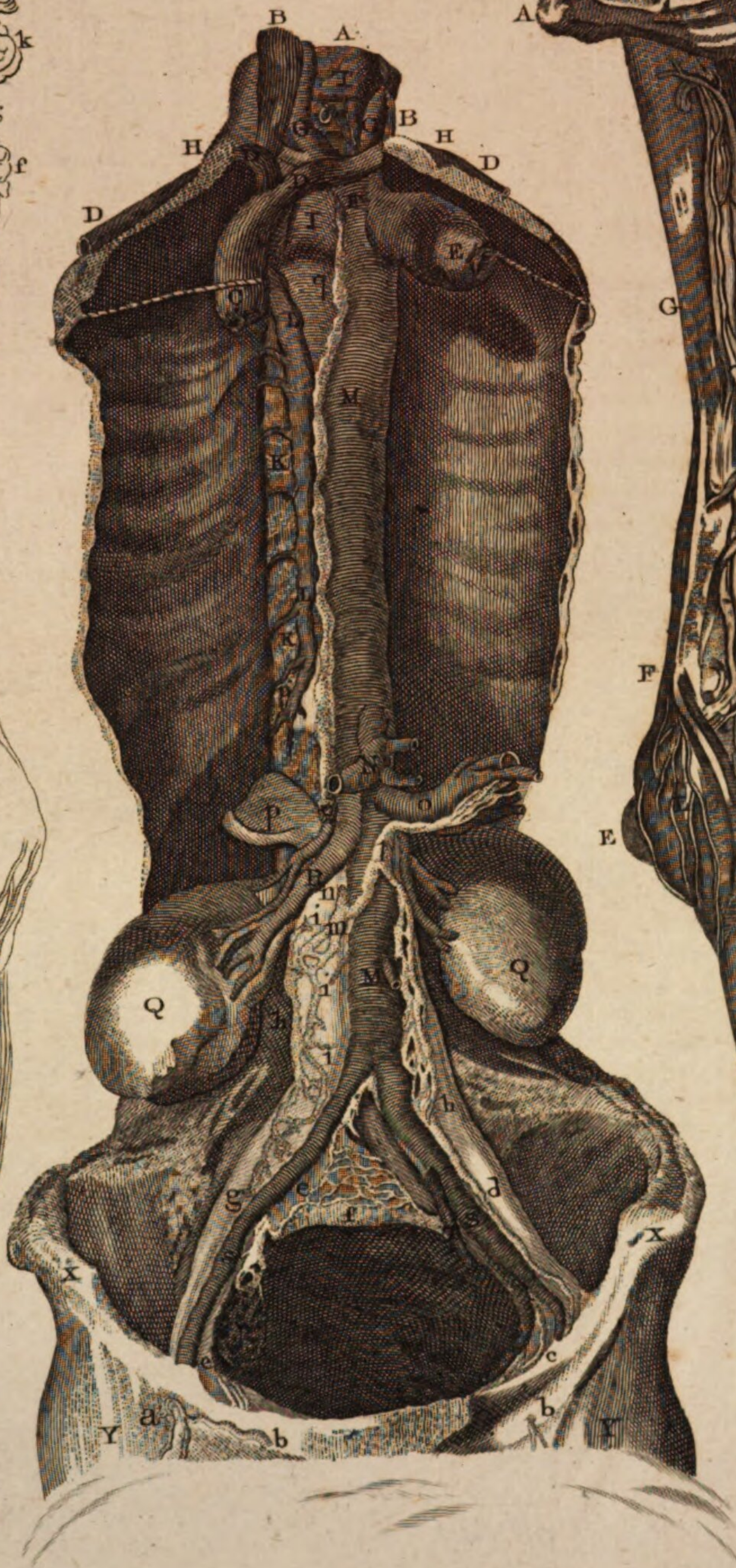
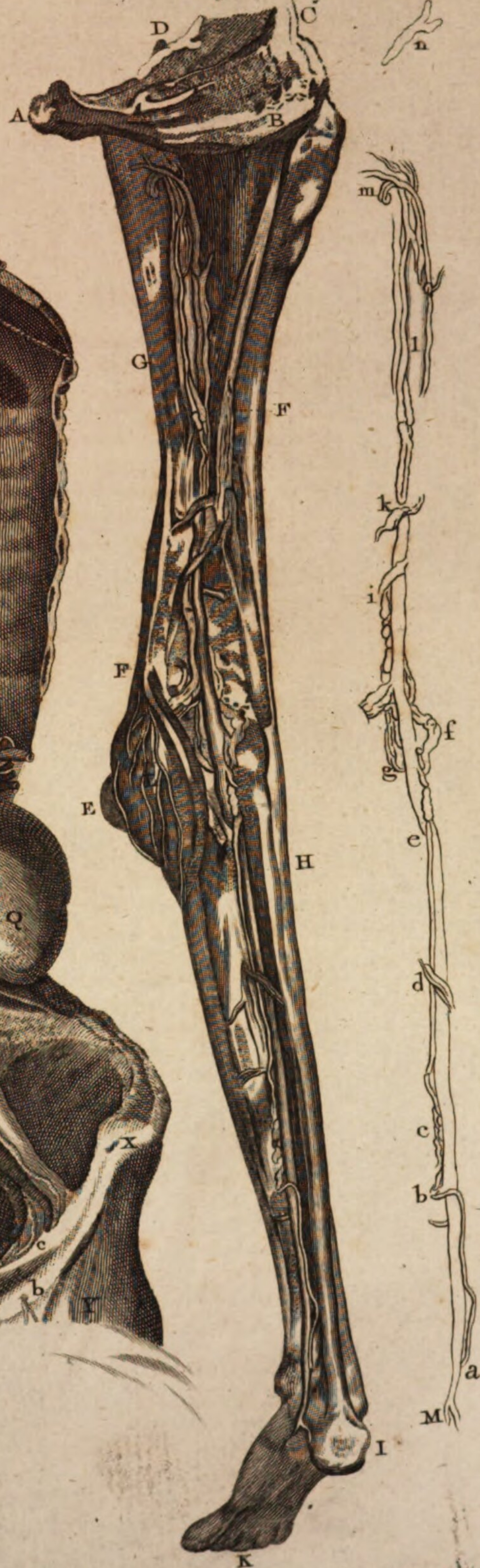


Fig. 2.



A. Bell Pinxt. H. Al. Sculptor fecit.

Of the Senses. of nerves,—which sends off p, The beginning of the great sympathetic. q, The remainder of the sixth pair, spent on c, The abductor oculi.

FIG. 6. Represents the head of a youth, where the upper part of the cranium is sawed off,—to show the upper part of the brain covered by the pia mater, the vessels of which are minutely filled with wax.

A A, The cut edges of the upper part of the cranium. B, The two tables and intermediate diploë. B B, The two hemispheres of the cerebrum. C C, The incisure made by the falx. D, Part of the tentorium cerebello super expansum. E, Part of the falx, which is fixed to the crista galli.

FIG. 7. Represents the parts of the External Ear, with the Parotid Gland and its Duct.

a, a, The helix. b, The antihelix. c, The anti-tragus. d, The tragus. e, The lobe of the ear. f, The cavitas innominata. g, The scapha. h, The concha. ii, The parotid gland. k, A lymphatic gland, which is often found before the tragus. l, The duct of the parotic gland. m, Its opening into the mouth.

FIG. 8. A view of the posterior part of the external

ear, meatus auditorius, tympanum, with its small bones, and Eustachian tube of the right side.

a, The back part of the meatus, with the small ceruminous glands. b, The incus. c, Malleus. d, The chorda tympani. e, Membrana tympani. f, The Eustachian tube. g, Its mouth from the fauces.

FIG. 9. Represents the anterior part of the right external ear, the cavity of the tympanum—its small bones, cochlea, and semicircular canals.

a, The malleus. b, Incus with its long leg, resting upon the stapes. c, Membrana tympani. d, e, The Eustachian tube, covered by part of—f f, The musculus circumflexus palati. 1, 2, 3, The three semicircular canals. 4, The vestibule. 5, The cochlea. 6, The portio mollis of the seventh pair of nerves.

FIG. 10. Shows the Muscles which compose the fleshy substance of the Tongue.

a a, The tip of the tongue, with some of the papillæ minimæ. b, The root of the tongue. c, Part of the membrane of the tongue, which covered the epiglottis. d d, Part of the musculus hyo-glossus. e, The lingualis. f, Genio-glossus. g g, Part of the stylo-glossus.

Anaxagoras *Anatomy of Plants.* See PLANTS.

Anatomy of Brutes. See *Comparative Anatomy.*

ANAXAGORAS, one of the most celebrated philosophers of antiquity, was born at Clazomene in Ionia about the 70th Olympiad. He was disciple of Anaximenes; and gave up his patrimony, to be more at leisure for the study of philosophy. He went first to Athens, and there taught eloquence; after which, having put himself under the tuition of Anaximenes, he gave lessons in philosophy in the same city. These he only gave to some particular friends and disciples, and with extreme caution. This, however, did not prevent, but rather was the cause of, his being accused of impiety, and thrown into prison, notwithstanding the credit and influence of Pericles, who was his disciple and intimate. Having been condemned to exile, he calmly yielded to the efforts of envy, and opened school at Lampsacum, where he was extremely honoured during the remainder of his life, and still more after his death, having had statues erected to his memory. He is said to have made some predictions relative to the phenomena of nature, upon which he wrote some treatises. His principal tenets may be reduced to the following:—All things were in the beginning confusedly placed together, without order and without motion. The principle of things is at the same time one and multiplex, which obtained the name of *homæmeries*, or similar particles, deprived of life. But there is beside this, from all eternity, another principle, namely an infinite and incorporeal spirit, who gave these particles a motion; in virtue of which, such as are homogeneous united, and such as were heterogeneous separated according to their different kinds. In this manner all things being put into motion by the spirit, and similar things being united to such as were similar, such as had a circular motion produced heavenly bodies, the lighter particles ascended, those which were heavy de-

scended. The rocks of the earth, being drawn up by the force of the air, took fire, and became stars, beneath which the sun and moon took their stations. Thus he did not look upon the stars as divinities.

ANAXARCHUS, a philosopher of Abdera, highly esteemed by Alexander the Great. His end was peculiarly tragical: having the misfortune to fall into the hands of the enemy, they pounded him alive in a mortar.

ANAXIMANDER, a famous Greek philosopher, born at Miletus in the 42d Olympiad, in the time of Polycrates tyrant of Samos. He was the first who publicly taught philosophy, and wrote upon philosophical subjects. He carried his researches into nature very far for the time in which he lived. It is said, that he discovered the obliquity of the Zodiac, was the first who published a geographical table, invented the gnomon, and set up the first sun-dial in an open place at Lacedæmon. He taught, that infinity of things was the principal and universal element; that this infinite always preserved its unity, but that its parts underwent changes; that all things came from it; and that all were about to return into it. According to all appearance, he meant by this obscure and indeterminate principle, the chaos of the other philosophers. He asserted, that there are an infinity of worlds; that the stars are composed of air and fire, which are carried in their spheres, and that these spheres are gods; and that the earth is placed in the midst of the universe, as in a common centre. He added, that infinite worlds were the product of infinity, and that corruption proceeded from separation.

ANAXIMENES, born at Miletus, an eminent Greek philosopher, friend, scholar, and successor of Anaximander. He diffused some degree of light upon the obscurity of his master's system. He made the first principle of things to consist in the air, which he considered

Anaxime-
nes
Ancestors.

sidered as immense or infinite, and to which he ascribed a perpetual motion. He asserted, that all things which proceeded from it were definite and circumscribed; and that this air, therefore, was God since the divine power resided in it and agitated it. Coldness and moisture, heat and motion, rendered it visible, and dressed it in different forms, according to the different degrees of its condensation. All the elements thus proceed from heat and cold. The earth was, in his opinion, one continued flat surface.

ANAXIMENES, the son of Aristocles of Lampfacus, an orator, the disciple of Diogenes the Cynic, and of Zoilus the railer against Homer. He was preceptor to Alexander of Macedon, and followed him to the wars. Alexander being incensed against the people of Lampfacus, they sent this philosopher to intercede for them. Alexander knowing the cause of his coming, swore that he would do the very reverse of whatever he desired of him. Anaximenes begged of him to destroy Lampfacus. Alexander, unwilling to break his oath and not able to elude this stratagem, pardoned Lampfacus much against his will.

ANAXIMANDRIANS, in the history of philosophy, the followers of Anaximander; the most ancient of the philosophical atheists who admitted of no other substance in nature but matter.

ANAZARBUS (Pliny), ANAZARBA (Stephanus); a town of Cilicia, on the river Pyramus, the birth place of Dioscorides, and of the poet Oppian. It was sometimes called *Casarea*, in honour either of Augustus or of Tiberius. The inhabitants are called *Anazarbeni* (Pliny), and on coins *Anazarbeis* after the Greek idiom. It was destroyed by a dreadful earthquake in the year 525, along with several other important cities: but they were all repaired at a vast expence by the emperor Justin; who was so much affected with their misfortune, that, putting off the diadem and purple, he appeared for several days in sack-cloth.

ANBERTKEND, in the eastern language, a celebrated book of the Brachmans, wherein the Indian philosophy and religion are contained. The word in its literal sense denotes the cistern wherein is the water of life. The anbertkend is divided into 50 beths, or discourses, each of which consists of ten chapters. It has been translated from the original Indian into Arabic, under the title of *Morat al Maani*, q. d. *the marrow of intelligence*.

ANCARANO, a town of Italy, in the march of Ancona, situated in E. Long. 14. 54. N. Lat. 42. 48.

ANCASTER, a town of Lincolnshire, situated in W. Long. 30. N. Lat. 52. 30. It gives title of duke to the noble family of Bertie.

ANCIENS, a town of France, in the province of Britany. W. Long 1. 9. N. Lat. 47. 20.

ANCESTORS, those from whom a person is descended in a straight line. The word is derived from the Latin *anceffor*, contracted from *anteceffor*, q. d. *goer before*.

Most nations have paid honours to their ancestors. It was properly the departed souls of their forefathers that the Romans worshipped under the denominations of *lares*, *lemures*, and *household gods*. Hence the ancient tombs were a kind of temples, or rather altars,

wherein oblations were made by the kindred of the Ancestors deceased.

The Russians have still their anniversary feasts in memory of their ancestors, which they call *roditoli sabot* q. d. *kingsfolk's sabbath*, wherein they make formal visits to the dead in their graves, and carry them provisions, eatables, and presents of divers other kinds. They interrogate them, with loud lamentable cries, What they are doing? How they spend their time? What it is they want? and the like.

The Quojas, a people of Africa, offer sacrifices of rice and wine to their ancestors before ever they undertake any considerable action. The anniversaries of their deaths are always kept by their families with great solemnity. The king invokes the soul of his father and mother to make trade flourish and the chase succeed.

The Chinese seem to have distinguished themselves above all other nations in the veneration they bear their ancestors. By the laws of Confucius, part of the duty which children owe their parents consists in worshipping them when dead. This service, which makes a considerable part of the natural religion of the Chinese, is said to have been instituted by the emperor Kun, the fifth in order from the foundation of that ancient empire. Bibl. Un. tom. vii. The Chinese have both a solemn and ordinary worship which they pay their ancestors. The former is held regularly twice a year, viz. in spring and autumn with much pomp. A person who was present at it gives the following account of the ceremonies on that occasion: The sacrifices were made in a chapel well adorned, where there were six altars furnished with censers, tapers, and flowers. There were three ministers, and behind them two young acolites. The three former went with a profound silence, and frequent genuflexions towards the five altars, pouring out wine: afterwards they drew near to the sixth, and when they came to the foot of the altar, half bowed down, they said their prayers with a low voice. That being finished, the three ministers went to the altar, the officiating priest took up a vessel full of wine, and drank; then he lifted up the head of a deer or goat; after which taking fire from the altar, they all lighted a bit of paper; and the minister of the ceremonies turning towards the people, said with a high voice, that he gave them thanks in the name of their ancestors for having so well honoured them; and in recompence he promised them, on their part, a plentiful harvest, a fruitful issue, good health, and long life, and all those advantages that are most pleasing to men.

The Chinese give their ancestors another simpler and more private worship. To this end they have in their houses a niche or hollow place, where they put the names of their deceased fathers, and make prayers and offerings of perfumes and spices to them at certain times, with bowing, &c. They do the like at their tombs.

The Jews settled in China are said to worship their ancestors like the heathens, and with the same ceremonies, except that they offer not swine's flesh. Near their synagogue they have a hall, or court of ancestors, wherein are niches for Abraham, Isaac, &c. The Jews also conformed, and were permitted by their general

Anchilops
||
Anchor.

neral to conform to this and many other superstitious customs of the Chinese.

There is one peculiarity of another kind, wherein the Chinese show their regard for their ancestors; in proportion as any of their descendants are preferred to a higher degree or dignity, their dead ancestors are at the same time preferred and ennobled with them. The kings Ven, Van, Veu, Van, and Cheu, Cum, who were descended from vassal kings, when they mounted the imperial throne, raised their ancestors from the vassal or depending state wherein these had lived to the dignity of emperors; so that the same honours were for the future rendered them as if they had been emperors of China. The same example was followed by the subsequent kings, and now obtains among the grandees and literati; all now worship their ancestors, according to the rank which they themselves hold in the world. If the son be a mandarin and the father only a doctor, the latter is buried as a doctor, but sacrificed to as a mandarin. The like holds in degradations, where the condition of the fathers is that of their sons.

ANCHILOPS, *αγκυλη*, contraction and *ωψ*, eye; in medicine, denotes an abscess, or collection of matter, between the great angle of the eye and the nose. If suffered to remain too long, or unskilfully managed, it degenerates, the stagnating humours corrupt, and an ulcer is produced. When the tumor is broke, and the tears flow involuntarily, whilst the os lacrymale is not carious, it is an *ægylops*; but when the ulcer is of a long standing, deep, fetid, and the os lacrymale becomes carious, it is a *fistula*. The cure is by restriction and excision, tying it at the root on the glandula lacrymalis, and, when ready, cutting it off. See *SURGERY-Index*.

ANCHISES, in fabulous history, a Trojan prince, descended from Dardanus, and the son of Capys. Venus made love to him in the form of a beautiful nymph; and bore him Æneas, the hero of Virgil's *Æneid*.

ANCHOR (*anchora*, Lat. from *αγκυρα*, Greek), a heavy, strong, crooked instrument of iron, dropped from a ship into the bottom of the water, to retain her in a convenient station in a harbour, road, or river.

The most ancient anchors are said to have been of stone; and sometimes of wood, to which a great quantity of lead was usually fixed. In some places, baskets full of stones, and sacks filled with sand, were employed for the same use. All these were let down by cords into the sea, and by their weight stayed the course of the ship. Afterwards they were composed of iron, and furnished with teeth, which, being fastened to the bottom of the sea, preserved the vessel immovable; whence *ὀδοντες* and *dentes* are frequently taken for anchors in the Greek and Latin poets. At first there was only one tooth, whence anchors were called *ἑνροστομοί*; but in a short time the second was added by Eupalamus, or Anacharsis, the Scythian philosopher. The anchors with two teeth were called *αμφιβόλοι* or *αμφιστομοί*; and from ancient monuments appear to have been much the same with those used in our days, only the transverse piece of wood upon their handles (the stock) is wanting in all of them. Every ship had several anchors; one of which, surpassing all the rest in bigness and strength, was peculiarly termed *ἡγεα* or *sacra*, and

was never used but in extreme danger; whence *sacram anchoram solvere*, is proverbially applied to such as are forced to their last refuge.

The anchors now made are contrived so as to sink into the ground as soon as they reach it, and to hold a great strain before they can be loosened or dislodged from their station. They are composed of a shank, a stock, a ring, and two arms with their flukes. The stock, which is a long piece of timber fixed across the shank, serves to guide the flukes in a direction perpendicular to the surface of the ground; so that one of them sinks into it by its own weight as soon as it falls, and is still preserved steadily in that position by the stock, which, together with the shank, lies flat on the bottom. In this situation it must necessarily sustain a great effort before it can be dragged through the earth horizontally. Indeed this can only be effected by the violence of the wind or tide, or both of them, sometimes increased by the turbulence of the sea, and acting upon the ship so as to stretch the cable to its utmost tension, which accordingly may dislodge the anchor from its bed, especially if the ground be soft and oozy, or rocky. When the anchor is thus displaced, it is said, in the sea-phrases, to *come home*.

That the figure of this useful instrument may be more clearly understood, let us suppose a long massy beam of iron erected perpendicularly, *b*, at the lower end of which are two arms, *d e*, of equal thickness with the beam (usually called the *shank*), only that they taper towards the points, which are elevated above the horizontal plane at an angle of 30 degrees, or inclined to the shank at an angle of 60 degrees; on the upper part of each arm (in this position) is a fluke or thick plate of iron, *g h*, commonly shaped like an isosceles triangle whose base reaches inwards to the middle of the arm. On the upper end of the shank is fixed the stock transversely with the flukes; the stock is a long beam of oak, *f*, in two parts, strongly bolted, and hooped together with iron rings. See also No. 2. Close above the stock is the ring *a*, to which the cable is fastened or *bent*: the ring is curiously covered with a number of pieces of short rope, which are twisted about it so as to form a very thick texture or covering called the *puddening*, and used to preserve the cable from being fretted or chafed by the iron.

Every ship has, or ought to have, three principal anchors, with a cable to each, viz. the sheet, *maitresse-ancre*, (which is the *anchora sacra* of the ancients); the best bower, *second ancre*; and small bower, *ancre d'af-fourche*, so called from their usual situation on the ship's bows. There are besides smaller anchors, for removing a ship from place to place in a harbour or river, where there may not be room or wind for sailing; these are the stream-anchor, *ancre de toue*; the kedge and grappling, *grapin*: this last, however, is chiefly designed for boats.

Method of making ANCHORS. The goodness of the anchor is a point of great importance. Great care is therefore to be taken, that the metal it is made of be neither too soft nor too brittle; the latter rendering it liable to break, and the former to straiten.

The shank, arms, and flukes, are first forged separately; then the hole is made at one end of the shank for the ring, which being also previously forged, is

Anchor.

Plate
XXIX.
fig. 1. n^o 1.

Anchor. put into the hole of the shank, and the two ends shut together. After which the arms are shut to the shank, one after the other, and the anchor is finished.

Proof is made of anchors, by raising them to a great height, and then letting them fall again on a kind of iron block placed across for the purpose. To try whether the flukes will turn to the bottom and take hold of the ground, they place the anchor on an even surface, with the end of one of the flukes, and one of the ends of the stock resting on the surface; in case the anchor turns, and the point of the flukes rises upwards, the anchor is good.

In England, France, and Holland, anchors are made of forged iron; but in Spain they are sometimes made of copper, and likewise in several parts of the South Sea.

For the proportions of anchors, according to Manwaring, the shank is to be thrice the length of one of the flukes, and half the length of the beam. According to Aubin, the length of the anchor is to be four tenths of the greatest breadth of the ship; so that the shank, *e. gr.* of an anchor in a vessel 30 feet wide, is to be 12 feet long. When the shank is, for instance, eight feet long, the two arms are to be seven feet long, measuring them according to their curvity. As to the degree of curvity given the arms, there is no rule for it; the workmen are here left to their own discretion.

The latter writer observes, that the anchor of a large heavy vessel is smaller in proportion, than that of a lesser and lighter one. The reason he gives is, that though the sea employs an equal force against a small vessel as against a great one, supposing the extent of wood upon which the water acts to be equal in both, yet the little vessel, by reason of its superior lightness, does not make so much resistance as the greater; the defect whereof must be supplied by the weight of the anchor.

From these and other hydrostatic principles, the following table has been formed; wherein is shown, by means of the ship's breadth within, how many feet the beam or shank ought to be long, giving it four-tenths or two-fifths of the ship's breadth within: by which proportion might be regulated the length of the other parts of the anchor. In this table is represented likewise the weight an anchor ought to be for a ship from eight feet broad to 45, increasing by one foot's breadth; supposing that all anchors are similar, or that their weights are as the cubes of the lengths of the shanks.

Breadth of the Vessel.	Feet.	Feet.	Pounds.
	8.	$3\frac{1}{2}$	33
	9.	$3\frac{3}{4}$	47
	10.	4	64
	11.	$4\frac{1}{2}$	84
	12.	$4\frac{3}{4}$	110
	13.	$5\frac{1}{2}$	140
	14.	$5\frac{3}{4}$	175
	15.	6	216
	16.	$6\frac{1}{2}$	262
	17.	$6\frac{3}{4}$	314
	18.	$7\frac{1}{2}$	373
	19.	$7\frac{3}{4}$	439
	20.	8	512
	21.	$8\frac{1}{2}$	592

Feet.	Feet.	Pounds.
22	$8\frac{1}{2}$	681
23	$9\frac{1}{2}$	778
24	$9\frac{3}{4}$	884
25	10	1000
26	$10\frac{1}{2}$	1124
27	$10\frac{3}{4}$	1259
28	$11\frac{1}{2}$	1405
29	$11\frac{3}{4}$	1562
30	12	1728
31	$12\frac{1}{2}$	1906
32	$12\frac{3}{4}$	2097
33	$13\frac{1}{2}$	2300
34	$13\frac{3}{4}$	2515
35	14	2742
36	$14\frac{1}{2}$	2986
37	$14\frac{3}{4}$	3242
38	$15\frac{1}{2}$	3512
39	$15\frac{3}{4}$	3796
40	16	4096
41	$16\frac{1}{2}$	4426
42	$16\frac{3}{4}$	4742
43	$17\frac{1}{2}$	5088
44	$17\frac{3}{4}$	5451
45	18	5832

M. Bouguer, in his *Traité de Navire*, directs to take the length of the shank in inches, and to divide the cube of it by 1160 for the weight. The reason is obvious; because the quotient of the cube of 201 inches, which is the length of an anchor weighing 7000 lb. divided by the weight, is 1160; and therefore, by the rule of three, this will be a common divisor for the cube of any length, and a single operation will suffice.

The same author gives the following dimensions of the several parts of an anchor. The two arms generally form the arch of a circle, whose centre is three-eighths of the shank from the vertex, or point where it is fixed to the shank; and each arm is equal to the same length, or the radius; so that the two arms together make an arch of 120 degrees: the flukes are half the length of the arms, and their breadth two-fifths of the said length. With respect to the thickness, the circumference at the throat, or vertex of the shank, is generally made about a fifth part of its length, and the small end two thirds of the throat; the small end of the arms of the flukes, three-fourths of the circumference of the shank at the throat. These dimensions should be bigger, when the iron is of a bad quality, especially if cast iron is used instead of forged iron.

At ANCHOR, the situation of a ship which rides by her anchor in a road or haven, &c. Plate XXIX. fig. 1. No. 3. represents the fore part of a ship as riding in this situation. See also BUOY-ROPE.

To *fish the ANCHOR*, to draw up the flukes upon the ship's sides after it is catted. See the articles DAVIT and FISH.

To *steer the Ship to her ANCHOR*, is to steer the ship's head towards the place where the anchor lies when they are heaving the cable into the ship; that the cable may thereby enter the hauls with less resistance, and the ship advance towards the anchor with greater facility.

ANCHOR.

Anchor

Anchusa

ANCHOR-Ground is a bottom which is neither too deep, too shallow, nor rocky; as in the first the cable bears too nearly perpendicular, and is thereby apt to jerk the anchor out of the ground; in the second, the ship's bottom is apt to strike at low water, or when the sea runs high, by which she is exposed to the danger of sinking; and in the third, the anchor is liable to hook the broken and pointed ends of rocks, and tear away its flukes, whilst the cable, from the same cause, is constantly in danger of being cut through as it rubs on their edges.

ANCHOR, in architecture, is a sort of carving, somewhat resembling an anchor. It is commonly placed as part of the enrichments of the bouldins of capitals of the Tuscan, Doric, and Ionic orders, and also of the bouldins of bed-mouldings of the Doric, Ionic, and Corinthian cornices, anchors and eggs being carved alternately through the whole building.

ANCHORS, in heraldry, are emblems, of hope, and are taken for such in a spiritual as well as a temporal sense.

ANCHORAGE, in law, is a duty upon ships for the use of the port or harbour where they cast anchor.

ANCHOVY, in ichthyology, the English name of the *clupea encrasicolus*. See **CLUPEA**.

ANCHOVY-PEAR. See **GRAS**.

ANCHUSA, **ALKANET** or **BUGLOSS**: A genus of the monogynia order belonging to the pentandria class of plants; and in the natural method ranking under the 41st order, *Asperifolia*. The *calyx* is a quinquepartite perianthium, oblong and persistent: The *corolla* is monopetalous and funnel-shaped, the throat closed with scales: The *filamina* consist of five short filaments; the antheræ oblong and covered; The *pyllium* has four germina, a filiform stylus, and obtuse stigma: There is no *pericarpium*, the calyx containing the seeds in its bosom: The *seeds* are four, oblong gibbous, and engraved at the base.

Species 1. The officinalis, or greater garden-bugloss, is a native of France and of the warmer parts of Europe, but will thrive well enough in Britain; but the roots seldom continue longer than two years in this country, unless they happen to grow in rubbish, or out of an old wall, where they will live three or four years.

2. The angustifolia, or perennial wild borage, grows to the height of two feet when cultivated in gardens; but in those places where it grows wild is seldom more than a foot and an half high. The leaves of this sort are narrow; the spikes of flowers come out double, and have no leaves about them; the flowers are small, and of a red colour. The roots will continue two years in a poor soil. *3.* The undulata, or Portugal bugloss, is a biennial plant, which grows to the height of two feet, and sends out many lateral branches. The flowers are of a bright blue colour, and grow in an imbricated spike. *4.* The orientalis, or eastern bugloss, is a native of the Levant; but hardy enough to bear the open air in Britain, if it hath a dry sandy soil. It is a perennial plant, with long trailing branches which lie on the ground. The flowers are yellow, and about the size of the common bugloss, and there is a succession of these on the same plants great part of the year. *5.* The virginiana, or puccoon, grows naturally in the woods of North America; and being an early plant, generally flowers before the new leaves come out on the

trees; so that in some woods where it abounds, the ground seems entirely covered with its yellow flowers. It is a perennial plant, which seldom rises a foot high in good ground, but not above half that height where the soil is poor. The flowers grow in loose spikes upon smooth stalks. *6.* The sempervirens, or evergreen-borage, is a very hardy perennial plant, with weak trailing branches. It grows naturally in some parts of Britain and Spain. The flowers are blue, and come out between the leaves on the spike, like the fourth sort. They appear during a great part of the year. *7.* The cretica, or warted bugloss of Crete, is a low trailing annual plant, whose branches seldom extend more than six inches. The flowers are small, of a bright blue colour, and are collected into small bunches at the extremity of the branches. The plants perish soon after their seeds are ripe. *8.* The tinctoria, or true alkanet, grows naturally in the Levant, but is equally hardy with the first species. The flowers grow in long spikes, coming out *imbricatum*, like the tiles of a house.

Culture. All the species of anchusa may be propagated by seeds; which should be sown, either in the spring or autumn, upon a bed of light sandy earth; and when the plants are strong enough to be removed, they must be planted on beds at two feet distance from one another, and watered if the season requires it, till they have taken root; after which they will require no other care than to keep them free from weeds.

Medicinal Uses, &c. The flowers of the first species have obtained the name of *cordial* flowers; to which they have no other title than that they moderately cool and soften, without offending the palate or stomach; and thus, in warm climates, or in hot diseases, may in some measure refresh the patient. The root of the tinctoria is likewise used, not as possessed of any medicinal virtue, but on account of its imparting an elegant red colour to oily substances; so is frequently directed as a colouring ingredient for ointments, plasters, &c. As the colour is confined to the cortical part, the small roots are to be preferred, as having proportionably more bark than the large ones. The alkanet root which grows in England is greatly inferior to what comes from abroad.

ANCHYLOBLEPHARON. See **ANCYLOBLEPHARON**.

ANCHYLOPS. See **ANCHILOPS**.

ANCHYLOSIS. See **ANCYLOSIS**.

ANCIENT, or **ANTIEN**, a term applied to things which existed long ago; thus we say, ancient nations, ancient customs, &c. See **ANTIQUITIES**.

ANCIENT, sometimes denotes elderly, or of long standing, in opposition to young, or new; thus we say, an ancient barrister, ancient buildings.

ANCIENT, in a military sense, denotes either the ensign or colours.

ANCIENT, in ships of war, the streamer or flag borne in the stern.

ANCIENT DEMESNE, in English law, is a tenure, whereby all manors belonging to the crown in William the Conqueror's and St. Edward's time were held. The numbers, names, &c. hereof were entered by the Conqueror, in a book called *Domesday Book*, yet remaining in the Exchequer; so that such lands as by that book appeared to have belonged to the crown at that

Anchusa

II

Ancient

Ancienty,
Ancillon.

that time, are called *ancient demesne*.—The tenants in ancient demesne are of two sorts; one who hold their lands frankly by charter; the other by copy of court-roll, or by the verge, at the will of the lord, according to the custom of the manor.—The advantages of this tenure are, 1. That tenants holding by charter cannot be rightfully impleaded out of their manor; and when they are, they may abate the writ, by pleading the tenure. 2. They are free from toll for all things relating to their livelihood and husbandry; nor can be impanelled on any inquest.—These tenants held originally by plowing the king's land, plashing his hedges, and the like service, for the maintenance of his household; and it was on this account that such liberties were given them, for which they may have writs of *monstraverunt* to such as take the duties of toll, &c.—No lands are to be accounted ancient demesne, but such as are held in socage. Whether land be ancient demesne or not, shall be tried by the book of DOOMSDAY.

ANCIENTY, in some ancient statutes, is used for eldership or seniority. The elder sister can demand no more than her other sisters, beside the chief mesne, by reason of her ancienty. This word is used in the statute of Ireland, 14. Hen. III.

ANCILLON (David), a minister of the reformed church at Metz, where he was born the 17th of March 1617. He studied from the ninth or tenth year of his age in the Jesuits college, where he gave such proofs of his genius, that the heads of the society tried every means to draw him over to their religion and party; but he continued firm against their attacks. He went to Geneva in 1623; and studied divinity under Spanheim, Diodati, and Tronchin, who conceived a very great esteem for him. He left Geneva in April 1641, and offered himself to the synod of Charenton in order to take upon him the office of a minister: his abilities were greatly admired by the examiners, and the whole assembly were so highly pleased with him, that they gave him the church of Meaux, the most considerable then unprovided for. Here he acquired a vast reputation for his learning, eloquence, and virtue, and was even highly respected by those of the Roman catholic communion. He returned to his own country in the year 1653, where he remained till the revocation of the edict of Nantes in 1685. He retired to Francfort after this fatal blow; and having preached in the French church at Hanau, the whole congregation were so edified by it, that they immediately called together the heads of the families, in order to propose that he might be invited to accept of being minister there. The proposition was agreed to: and he began the exercise of his ministry in that church about the end of the year 1685. His preaching made so great a noise at Hanau, that the professors of divinity, and the German and Dutch ministers, attended his sermons frequently: the count of Hanau himself, who had never before been seen in the French church, came thither to hear Mr Ancillon: they came from the neighbouring parts, and even from Francfort; people who understood nothing of French flocked together with great eagerness, and said they loved to see him speak. This occasioned a great jealousy in the two other ministers; which tended to make his situation uneasy. He therefore went to Berlin; where he met with a kind reception from his highness

the elector, and was made minister of the city. Here he had the pleasure of seeing his eldest son made judge and director of the French in the same city, and his other son rewarded with a pension and entertained at the university of Francfort upon the Oder. He had likewise the satisfaction of seeing his brother made judge of all the French in the states of Brandenburg; and Mr Cayart his son-in-law, engineer to his electoral highness. He enjoyed these agreeable circumstances, and several others till his death, which happened at Berlin the 3d of September, 1692, when he was 75 years of age.—Mr Ancillon having got a considerable fortune by marriage, was enabled thereby to gratify his passion for books; his library was accordingly very curious and large, and he increased it every day with all that appeared new and important in the republic of letters, so that at last it was one of the noblest collections in the hands of any private person in the kingdom. He published a book, in quarto, in which the whole dispute concerning Traditions is fully examined: he also wrote an apology for Luther, Zuinglius, Calvin, and Beza, and several other pieces.

ANCLAM, a strong town of Germany, in the circle of Upper Saxony, and duchy of Pomerania, remarkable for its excellent pastures. It is seated on the river Pene. E. Long. 14. 5. N. Lat. 54 10.

ANCLE, or ANKLE. See ANKLE.

ANCONA (marquise of), a province in the pope's territories in Italy. It lies between the gulph of Venice and mount Appenine, which bound it on the north; Abruzzo on the east; the duchy of Spoleto, and that of Urbino on the west. The air is indifferent; but the soil is fruitful, particularly in hemp and flax; and there is great plenty of wax and honey. It contains several large towns, as Fermo, Loretto, Recanati, Macerata, Jesi, Tolentino, Ascoli, Ofimo, St Severino, Monte Alto, Camerino, and Ripatransone, which are all archiepiscopal or episcopal sees.

ANCONA, a sea-port town of Italy, the capital of the marquise of that name, and the see of a Bishop. It was formerly the finest port in all Italy, being built by the emperor Trajan, about the year 115; but was almost ruined, and its trade lost: however, it has again begun to revive. Its harbour is the best in all the pope's dominions. The town lies round it on two hills; one of which is at the point of Cape St Syriaco, from whence there is a delightful prospect. On the other stands the citadel, which commands the town and harbour. The streets of this city are narrow and uneven; and the public and private buildings inferior to those of the other great towns in Italy. The cathedral is a low dark structure; and though the front is covered with fine marble, the architecture has neither beauty nor regularity. The church of St Dominic, and that of the Franciscans, have each an excellent picture of Titian. The exchange, where the merchants meet, is a handsome square portico, in which is an equestrian statue of Trajan, who first built the port. At the four corners are four other statues. The triumphal arch of Trajan remains almost entire, with its inscription. The common people in this town are a little particular and fantastical in their dress, but the better sort follow the French mode. It is a great thoroughfare from the north of Italy to Loretto; which renders provisions very dear.

Anclam
||
Ancona.

Ancones
||
Ancourt.

dear. The tide does not rise here above a foot, and near the Mediterranean it is scarce visible. E. Long. 15. 5. N. Lat. 43. 36.

ANCONES, in architecture, the corners or quoins of walls, cross-beams, or rafters.—Vitruvius calls the *consoles* by the same name.

ANCONY, in the iron-works, a piece of half-wrought iron, of about three quarters of 100 weight, and of the shape of a bar in the middle, but rude and unwrought at the ends. The process for bringing the iron to this state is this: They first melt off a piece from a sow of cast iron, of the proper size; this they hammer at the forge into a mass of two feet long, and of a square shape, which they call a *blom*; when this is done, they send it to the finery; where, after two or three heats and workings, they bring it to this figure, and call it an *ancony*. The middle part beat out at the finery, is about three feet long, and of the shape and thickness the whole is to be; this is then sent to the chafery, and there the ends are wrought to the shape of the middle, and the whole made into a bar. See BAR.

ANCORARUM URBS, *Ἀγκυρων Πολις*, a city in the Nomos Aphroditopolites, towards the Red Sea; so called because there was in the neighbourhood a stone quarry, in which they hewed stone anchors (Ptolemy,) before iron anchors came to be used. The gentilicious name is *Ancyropolites*, (Stephanus).

ANCOURT (Florent-Cartond'), an eminent French actor and dramatic writer, born at Fontainebleau. October 1661. He studied in the Jesuits college at Paris, under father de la Rue; who, discovering in him a remarkable vivacity and capacity for learning, was extremely desirous of engaging him in their order; but Ancourt's aversion to a religious life rendered all his efforts ineffectual. After he had gone through a course of philosophy, he applied himself to the civil law, and was admitted advocate at 17 years of age. But falling in love with an actress, he was induced to go upon the stage, and he married her. As he had all the qualifications necessary for the theatre, he soon greatly distinguished himself: and not being satisfied with the applause only of an actor, he began to write pieces for the stage; many of which had such prodigious success, that most of the players grew rich from the profits of them. His merit in this way procured him a very favourable reception at court; and Lewis XIV. showed him many marks of his favour. His sprightly conversation and polite behaviour made his company agreeable to all the men of figure both at court and in the city, and the most considerable persons were extremely pleased to have him at their houses. Having taken a journey to Dunkirk, to see his eldest daughter who lived there, he took the opportunity of paying his compliments to the elector of Bavaria, who was then at Brussels: this prince received him with the utmost civility; and having detained him a considerable time, dismissed him with a present of a diamond valued at 1000 pistoles: he likewise rewarded him in a very generous manner, when, upon his coming to Paris, Ancourt composed an entertainment for his diversion. Ancourt began at length to grow weary of the theatre, which he quitted in Lent 1718, and retired to his estate of Courcelles le Roy, in Berry, where he applied himself whol-

ly to devotion, and composed a translation of David's Psalms in verse, and a sacred tragedy, which were never printed. He died the 6th of December 1726, being 65 years of age.—The plays which he wrote are 52 in all; most of which were printed separately at the time when they were first represented: they were afterwards collected into five volumes, then into seven, and at last into nine. This last edition is the most complete.

ANCRE, a small town of France, in Picardy, with the title of a marquisate, seated on a little river of the same name. E. Long. 2. 45. N. Lat. 49. 59.

ANCUS MARTIUS, the fourth king of the Romans, succeeded by Tullius Hostilius, 639 years before Christ. He defeated the Latins, subdued the Fidenates, conquered the Sabines, Volscii, and Veientes, enlarged Rome by joining to it mount Janicula, and made the harbour of Ostia. He died about 615 years before the Christian æra.

ANCYLE, in antiquity, a kind of shield that fell, as was pretended, from heaven, in the reign of Numa Pompilius; at which time, likewise, a voice was heard declaring that Rome should be mistress of the world as long as she should preserve this holy buckler. It was kept with great care in the temple of Mars, under the direction of twelve priests; and lest any should attempt to steal it, eleven others were made to like, as not to be distinguished from the sacred one. These ancyliæ were carried in procession every year round the city of Rome.

ANCYLE, in surgery. See ANCYLOSIS.

ANCYLOBLEPHARON, (from *αγκυλος bent*, and *βλεφαρον an eye-lid*); a disease of the eye, which closes the eye-lids. Sometimes the eye-lids grow together, and also to the tunica albuginea of the eye, from carelessness when there is an ulcer in these parts. Both these cases are called *ancyloblepharon* by the Greeks. This disorder must be distinguished from that coalition of the eye-lids which happens from viscid matter gluing them together. If the cohesion is on the cornea, the sight is inevitably lost. This hath sometimes happened in the small pox. If there is only a growing together of the eye-lids, they may be separated with the specillum, and pledgets kept between them to prevent their re-union. If the eye-lids adhere to the eye, they are to be separated by a fine-edged knife; and their re-union is to be prevented by a proper use of injections, and lint placed between them, after dipping it in some proper liniment.

ANCYLOGLOSSUM, from *αγκυλος crooked*, and *γλωσση the tongue*); a contraction of the ligaments of the tongue. Some have this imperfection from their birth, others from some disease. In the first case, the membrane which supports the tongue is too short or too hard: in the latter, an ulcer under the tongue, healing and forming a cicatrix, is sometimes the cause: These speak with some difficulty. The ancyloglossi by nature are late before they speak; but when they begin, they soon speak properly. These we call *tongue-tied*. Mauriceau says, that in this case it is a small membranous production, which extends from the frænulum to the tip of the tongue, that hinders the child from sucking, &c. He justly condemns the cruel practice among nurses, of tearing this membrane with their nails; for thus ulcers are sometimes formed, which are

Ancte
||
Ancyloglossum.

Ancy'osis
||
Andaman.

of difficult cure : he advises to snip it with scissars in two or three places, taking care not to extend the points of the scissars so far as the frænulum. The instances rarely occur which require any kind of assistance ; for if the child can thrust the tip of its tongue to the outer edge of its lip, this disease does not exist ; and if the tongue is not greatly restrained, the frænulum will stretch by the child's sucking and crying.

ANCYLOSIS, in surgery, implies a distortion or stiffness of the joints, caused by a settlement of the humours, or a distension of the nerves, and therefore remedies of a mollifying and relaxing nature are required.

ANCYRA, the capital of Galatia, (Livy, Pliny, Ptolemy) ; at no great distance from the river Halys, (Livy) : said to be built by Midas, king of Phrygia, and to take its name from an anchor found there, (Pausanias). It was greatly improved by Augustus, deemed the second founder of it, as appears from the *Marmor Ancyrænum*. It is now called *Angura* or *Angoura*. E. Long. 33°. Lat. 41. 20.

ANCYSTRUM, in botany : A genus of the digynia order, belonging to the diandria class of plants ; the essential characters of which are : the *calyx* is a single-leaved, four-toothed perianthium, four-awn'd, the awns terminated with cross barbs : The *corolla* is four-cleft ; the stigma pencil'd.

ANDABATÆ, in antiquity, a sort of gladiators, who mounted on horseback or in chariots, fought hoodwinked, having a helmet that covered their eyes.

ANDALUSIA, is the most western province of Spain, having Estremadura and La Mancha on the north ; the kingdom of Granada, the straits of Gibraltar, and the Ocean, on the east and south ; and, on the west, the kingdom of Algarva in Portugal, from which it is separated by the river Guadiana. It is about 182 miles long, and 150 broad. The chief cities and towns are Seville the capital, Baeza, Gibraltar, Corduba, Cadiz, Medina Sidonia, Jaen, Port St Mary, &c. It is the best, most fruitful, and the richest part of all Spain. There is a good air, a serene sky, a fertile soil, and a great extent on the sea-coast, fit for commerce.

New Andalusia, a division of the province of Terra Firma in South America, whose boundaries cannot be well ascertained, as the Spaniards pretend a right to countries in which they have never established any settlements. According to the most reasonable limits, it extends in length 500 miles from north to south, and about 270 in breadth from east to west. The interior country is woody and mountainous, variegated with fine valleys that yield corn and pasturage. The produce of the country consists chiefly in dying drugs, gums, medicinal roots, brazil wood, sugar, tobacco, and some valuable timber. To this province also belonged five valuable pearl-fisheries. The capital of New Andalusia is Comana, Cumana, or New Corduba, situated in N. Lat. 9. 55. about nine miles from the north sea. Here the Spaniards laid the foundation of a town in the year 1520. The place is strong by nature, and fortified by a castle capable of making a vigorous defence ; as appeared in the year 1670, when it was assaulted by the buccaneers, who were repulsed with very great slaughter.

ANDAMAN or ANDEMAN Islands, in the East Indies, situated about 80 leagues distance from Tanas-

serim on the coast of Siam. They are but little known ; Andante only the East India ships sometimes touch at them, and are supplied by the natives with rice, herbs, and fruits ; the inhabitants are by some represented as an harmless inoffensive race of men, and by others as cannibals. E. Long. 92. 0. N. Lat. from 10°. to 15°.

ANDANTE, in music, signifies a movement moderately slow, between *largo* and *allegro*.

ANDEGAVI, (Tacitus) ; ANDEGAVI, (Pliny) ; ANDES, (Cæsar) ; ANDI, (Lucan) : A people of Gallia Celtica, having the Turones to the east, the Namnetes to the west, the Pictones to the south, and the Aulerici Cœnomani to the north : now *Anjou*.

ANDEGAVI, or ANDEGAVUS, a town of Gallia Celtica, (Pliny, Ptolemy ; now *Angiers*. Called *Andecavi*, (Tacitus). W. Long. 30. Lat. 47. 30.

ANDELY, a town of Normandy in France, parted in two by a paved causeway. Here is a fountain to which pilgrims flock from all parts, to be cured of their disorders, on the feast-day of the saint to which it is dedicated. It is 20 miles S. E. of Rouen, and five N. W. of Paris. E. Long. 1. 30. N. Lat. 49. 20.

ANDENA, in old writers, denotes the swath made in mowing of hay, or as much ground as a man could stride over at once.

ANDEOL (St), a town of France, in the Vivarez, five miles S. of St Viviers, whose bishop formerly resided there. E. Long. 2. 50. N. Lat. 44. 24.

ANDERAB, the most southern city of the province of Balkh, possessed by the Usbeck Tartars. It is very rich and populous, but a place of no great strength. The neighbouring mountains yield excellent quarries of lapis lazuli, in which the Bukhars drive a great trade with Persia and India.—This city is situated at the foot of the mountains dividing the dominions of the Great Mogul and Persia from Great Bukharia. As there is no other way of crossing these mountains but by the road through this city, all travellers with goods must pay 4 per cent. On this account the Khan of Balkh maintains a good number of soldiers in the place.

ANDERNACHT, a city of Cologne, in the circle of the Lower Rhine. It is situated in a plain on the river Rhine ; and is fortified with a wall, castle, and bulwarks. It has a trade in stone jugs and pitchers, which are sent to the mineral waters at Dunchstein. There are three monasteries here, and several churches. E. Long. 7. 4. N. Lat. 50. 27.

ANDERO (St), a sea-port town in the bay of Biscay in Old Castile, seated on a small peninsula. It is a trading town, and contains about 700 houses, two parish-churches, and four monasteries. Here the Spaniards build and lay up some of their men of war. W. Long. 4. 30. N. Lat. 43. 20.

ANDERSON (Sir Edmund), a younger son of an ancient Scotch Family settled in Lincolnshire. He was some time a student of Lincoln college, Oxford ; and removed from thence to the Inner Temple, where he applied himself diligently to the study of the law, and became a barrister. In the 9th of queen Elizabeth he was both lent and summer reader, and in the 16th double reader. He was appointed her majesty's serjeant at law in the 19th year of her reign ; and some time after, one of the justices of the assize. In 1582,

was

Anderfon,
Andes.

was made lord chief justice of the common pleas, and in the year following was knighted. He held his office to the end of his life, died in the year 1605, and was buried at Eyworth in Bedfordshire. He was an able, but punctilious lawyer; a scourge to the Puritans; and a strenuous supporter of the established church. His works are, 1. Reports of many principal cases argued and adjudged in the time of Queen Elizabeth, in the common bench. Lond. 1644, fol. 2. Resolutions and judgments on the cases and matters agitated in all the courts of Westminster, in the latter end of the reign of Queen Elizabeth. Published by John Goldsborough, Esq; Lond. 1653, 4to. Besides these, there is a manuscript copy of his Readings still in being.

ANDERSON (Adam), a native of Scotland, was brother to the reverend James Anderson, D. D. editor of the *Diplomata Scotiæ* and *Royal Genealogies*, many years since minister of the Scots Presbyterian church in Swallow street, Piccadilly, and well known in those days among the people of that persuasion resident in London by the name of Bishop Anderson, a learned but imprudent man, who lost a considerable part of his property in the fatal year 1720. He married, and had issue a son, and a daughter who was the wife of an officer in the army.

Adam Anderson was for 40 years a clerk in the South Sea House; and at length arrived to his acmé there, being appointed chief clerk of the Stock and New Annuities, which office he retained till his death. He was appointed one of the trustees for establishing the colony of Georgia in America; and was also one of the court of assistants of the Scots corporation in London. The time of the publication of his "Historical and Chronological Deduction of Trade and Commerce," a work replete with useful information, was about the year 1762. He was twice married; by the first wife he had issue a daughter, married to one Mr Hardy, an apothecary in the Strand, who are both dead without issue; he afterwards became the third husband of the widow of Mr Coulter, formerly a wholesale linen-draper in Cornhill, by whom he had no issue. She was, like him, tall and graceful; and her face has been thought to have some resemblance to that of the ever-living countess of Desmond, given in Mr Pennant's first Tour in Scotland. Mr Anderson died at his house in Red Lion street, Clerkenwell, January 10. 1775. He had a good library of books, which were sold by his widow, who survived him several years, and died in 1781.

ANDES, a great chain of mountains in South America, which running from the most northern part of Peru to the straits of Magellan, between 3 and 4000 miles, are the longest and most remarkable in the world. The Spaniards call them the *Cordillera de los Andes*; they form two ridges, the lowermost of which is overspread with woods and groves, and the uppermost covered with everlasting snow. Those who have been at the top, affirm, that the sky is always serene and bright; the air cold and piercing; and yet so thin, that they were scarce able to breathe, and the respiration was much quicker than ordinary; and this is attended with reaching and vomiting; which, however, has been considered by some as merely accidental. When they looked downwards, the country was hid by the

VOL. I. Part II.

clouds that hovered on the mountain's sides. The mountains just mentioned, which have been frequently ascended, are much inferior in height to many others in this enormous chain. The following is the account given of the mountain called *Pichincha*, by the mathematicians sent by the kings of France and Spain to make observations in relation to the figure of the earth.

Soon after our artists arrived at Quito, they determined to continue the series of the triangles for measuring an arch of the meridian to the S. of that city: the company accordingly divided themselves into two bodies, consisting of French and Spaniards, and each retired to the part assigned them. Don George Juan and M. Godin, who were at the head of one party, went to the mountain of Pambamarca; while M. Bougeur, de la Condamine, and Don Ulloa, together with their assistants, climbed up to the highest summit of Pichincha. Both parties suffered extremely, as well from the severity of the cold as from the impetuosity of the winds, which on these heights blow with incessant violence; difficulties the more painful, as they had been little used to such sensations. Thus in the torrid zone, nearly under the equinoctial, where it is natural to suppose they had most to fear from the heat, their greatest pain was caused by the excessiveness of the cold.

Their first scheme for shelter and lodging in these uncomfortable regions, was to pitch a field-tent for each company; but on Pichincha this could not be done from the narrowness of the summit: they were therefore obliged to be contented with a hut so small that they could hardly all creep into it. Nor will this appear strange, if the reader considers the bad disposition and smallness of the place, it being one of the loftiest crags of a rocky mountain, 100 fathoms above the highest part of the desert of Pichincha. Such was the situation of their mansion, which, like all the other adjacent parts, soon became covered with ice and snow. The ascent up this stupendous rock, from the base, or the place where the mules could come, to their habitation, was so craggy as only to be climbed on foot; and to perform it cost them four hours continual labour and pain, from the violent efforts of the body, and the subtilty of the air; the latter being such as to render respiration difficult.

The strange manner of living to which our artists were reduced during the time they were employed in a geometrical mensuration of some degrees of the meridian, may not perhaps prove unentertaining to the reader; and therefore the following account is given as a specimen of it. The desert of Pichincha, both with regard to the operations performed there and its inconveniences, differing very little from others, an idea may be very easily formed of the fatigues, hardships, and dangers, to which they were continually exposed during the time they were prosecuting the enterprize, with the conduct of which they had been honoured. The principal difference between the several deserts consisted in their greater or lesser distance from places where they could procure provisions; and in the inclemency of the weather, which was proportionate to the height of the mountains, and the season of the year.

They generally kept within their hut. Indeed they were obliged to do this, both on account of the intenseness

Andes.

tenfeness of the cold, the violence of the wind, and their being continually involved in so thick a fog, that an object at six or eight paces was hardly discernible. When the fog cleared up, the clouds by their gravity moved nearer to the surface of the earth, and on all sides surrounded the mountains to a vast distance, representing the sea, with their rock like an island in the centre of it. When this happened, they heard the horrid noises of the tempests which then discharged themselves on Quito and the neighbouring country. They saw the lightnings issue from the clouds, and heard the thunders roll far beneath them: and whilst the lower parts were involved in tempests of thunder and rain, they enjoyed a delightful serenity; the wind was abated, the sky clear, and the enlivening rays of the sun moderated the severity of the cold. But their circumstances were very different when the clouds rose: their thickness rendered respiration difficult; the snow and hail fell continually; and the wind returned with all its violence; so that it was impossible entirely to overcome the fears of being, together with their hut, blown down the precipice on whose edge it was built, or of being buried under it by the daily accumulations of ice and snow.

The wind was often so violent in these regions, that its velocity dazzled the sight, whilst their fears were increased from the dreadful concussions of the precipice, caused by the fall of enormous fragments of rocks. These crushes were the more alarming, as no other noises are heard in these deserts; and during the night, their rest, which they so greatly wanted, was frequently disturbed by such sudden sounds. When the weather was any thing fair with them, and the clouds gathered about some of the other mountains which had a connection with their observations, so that they could not make all the use they desired of this interval of good weather, they left their hut to exercise themselves. Sometimes they descended to some small distance; and at others, amused themselves with rolling large fragments of rocks down the precipice; and these frequently required the joint strength of them all, though they often saw the same effected by the mere force of the wind. But they always took care in their excursions not to go so far out, but that on the least appearance of the clouds gathering about their cottage, which often happened very suddenly, they could regain their shelter. The door of their hut was fastened with thongs of leather, and on the inside not the smallest crevice was left unstopped; beside which, it was very compactly covered with straw: but, notwithstanding all their care, the wind penetrated through. The days were often little better than the nights; and all the light they enjoyed was that of a lamp or two, which they kept continually burning.

Though their hut was small, and crowded with inhabitants, beside the heat of the lamps; yet the intenseness of the cold was such, that every one of them was obliged to have a chafing dish of coals. These precautions would have rendered the rigour of the climate supportable, had not the imminent danger of perishing by being blown down the precipice, roused them, every time it snowed, to encounter the severity of the outward air, and fall out with shovels to free the roof of their hut from the masses of snow which were gathering on it. Nor would it, without this precaution, have

been able to support the weight. They were not indeed without servants and Indians; but these were so benumbed with the cold, that it was with great difficulty they could get them out of a small tent, where they kept a continual fire. So that all our artists could obtain from them was to take their turns in this labour; and even then they went very unwillingly about it, and consequently performed it slowly.

It may easily be conceived what this company suffered from the asperities of such a climate. Their feet were swelled; and so tender, that they could not even bear the heat; and walking was attended with extreme pain. Their hands were covered with chilblains; their lips swelled and chopped; so that every motion in speaking, or the like, drew blood; consequently they were obliged to strict taciturnity, and little disposed to laugh, as, by causing an extension of the lips, it produced such fissures as were very painful for two or three days after.

Their common food in this inhospitable region was a little rice boiled with some flesh or fowl, procured from Quito; and, instead of fluid water, their pot was filled with ice; they had the same resource with regard to what they drank; and while they were eating, every one was obliged to keep his plate over a chafing-dish of coals, to prevent his provisions from freezing. The same was done with regard to the water. At first they imagined the drinking strong liquors would diffuse a heat through the body, and consequently render it less sensible of the painful sharpness of the cold; but, to their surprise, they felt no manner of strength in such liquors, nor were they any greater preservative against the cold than the common water.

At the same time, they found it impossible to keep the Indians together. On their first feeling of the climate, their thoughts were immediately turned on deserting their masters. The first instance they had of this kind was so unexpected, that, had not one, of a better disposition than the rest, staid and acquainted them of their design, it might have proved of very bad consequence. The affair was this: There being on the top of the rock no room for pitching a tent for the Indians, they used every evening to retire to a cave at the foot of the mountain; where, beside a natural diminution of the cold, they could keep a continual fire, and consequently enjoyed more comfortable quarters than their masters. Before they withdrew at night, they fastened, on the outside, the door of the hut, which was so low that it was impossible to go in or out without stooping; and as every night the hail and snow which had fallen formed a wall against the door, it was the business of one or two of the Indians to come early and remove this obstruction. For though the negro servants were lodged in a little tent, their hands and feet were so covered with chilblains, that they would rather have suffered themselves to have been killed than move. The Indians therefore came constantly up to dispatch this work betwixt nine or ten in the morning; but they had not been there above four or five days, when they were not a little alarmed to see ten, eleven and twelve o'clock come, without any news of their labourers; when they were relieved by the honest servant mentioned above, who had withstood the seduction of his countrymen, and informed his masters of the desertion of the four others. As soon as the snow was cleared away from

Andes.

the

Andes. the door, they dispatched the Indian to the corregidor of Quito, who with equal dispatch sent other Indians, threatening to chastise them severely if they were wanting in their duty.

But the fear of punishment was not sufficient to induce them to support the rigour of this situation; for within two days they deserted. The corregidor therefore, to prevent any other inconvenience, sent four Indians under the care of an alcalde, and gave orders for their being relieved every fourth day.

Twenty-three tedious days our artists spent on this rock, viz. to the 6th of September, and even without any possibility of finishing their observations of the angles: for when it was fair and clear weather with them, the others, on whose summits the signals which formed the triangles for measuring the degrees of the meridian, were hid in the clouds; and when those were clear, Pichincha was involved in clouds. It was therefore necessary to erect their signals in a lower situation, and in a more favourable region. This, however, did not produce any change in their habitation till the beginning of December; when, having finished the observations which particularly concerned Pichincha, they proceeded to others; but with no abatement either of inconveniences, cold, or fatigue; for the places where they made their observations being necessarily on the highest parts of the deserts, the only respite in which they enjoyed some little ease was during the short interval of passing from one to the other.

In all their stations subsequent to that on Pichincha, during their fatiguing mensuration of the degrees of the meridian, each company lodged in a field tent, which, though small, they found less inconvenient than the hut on Pichincha; though at the same time they had more trouble, being oftener obliged to clear it from the snow, as the weight of it would otherwise have demolished the tent. At first, indeed, they pitched it in the most sheltered places; but on taking a resolution that the tents themselves should serve for signals, to prevent the inconvenience of having others of wood, they removed them to a more exposed situation, where the impetuosity of the winds sometimes tore up the piquets, and blew them down.

Though this mountain is famous for its great height, it is considerably lower than the mountain of Cotapaxi: but it is impossible to conceive the coldness of the summit of the last mentioned mountain from that felt on this; since it must exceed every idea that can be formed by the human mind, tho' they are both seated in the midst of the torrid zone. In all this range of mountains, there is said to be a constant inferior boundary, beyond which the snow never melts: this boundary, in the midst of the torrid zone, is said by some to be 2434 fathoms above the level of the sea; by others, only 2400 feet. The snow indeed falls much lower, but then it is subject to be melted the very same day. It is affirmed, that there are in the Andes 16 volcanos or burning mountains, which throw out fire and smoke with a terrible noise. The height of Chimborazo, said to be the highest peak of the Andes, has been determined by geometrical calculations to be 20,282 feet. But the great differences between the calculators of the height of mountains in other parts of the world, must very much diminish the credit of such calculations. Instances of this we have already given under the article *Æt-*

NA. No less remarkable are the differences concerning the height of the peak of Teneriffe; which, according to the calculations of Varenus, is three miles and three quarters, or 19,800 feet; according to those of Dr Herberden, it is only 15,396 feet; and according to those of M. Feuille, is no more than 13,128 feet. From these specimens, we can scarce avoid concluding, that all the methods hitherto invented for calculating the exact height of mountains are insufficient.

As all or most rivers have their source in mountains, it is no wonder a great number run down the sides of the Andes. Some hurry along with a prodigious rapidity; while others form beautiful cascades, or run thro' holes in rocks, which look like bridges of a stupendous height. There is a public road through the mountains, 1000 miles in length, part of which runs from Quito to Cusco.

ANDES, a hamlet of Mantua in Italy, the birth-place of Virgil. Hence the Epithet *Andinus* (Silius Italicus). Now called *Pietola*, two miles to the west of Mantua.

ANDETRIUM; ANDRETUM (Strabo); ANDECRUM, or ANDRECIUM (Ptolemy). An inland town of Dalmatia. The genuine name is *Andetrium* (Inscription). It is described as situated near Salonæ, on a naturally strong and inaccessible rock, surrounded with deep valleys, with rapid torrents; from which it appears to be the citadel now called *Cliffa*. E. Long. 17. 46. Lat. 43. 20.

ANDEUSE, a city of Languedoc in France, situated in E. Long. 3. 40. and N. Lat. 43. 45.

ANDOMADUNUM; ANDOMATUNUM (Ptolemy); and ANTEMATUNUM (Antonine); CIVITAS LINGONUM (Tacitus): A city of Gallia Belgica; now *Langres* in Champagne, situated on an eminence (which seems to justify the termination *dunum*), on the borders of Burgundy, at the springs of the Marne. Tacitus calls an inhabitant *Lingon*. E. Long. 5. 22. N. Lat. 48. 0.

ANDOVER, a large market-town in Hampshire, on the London road. It is seated on a branch of the river Test, and sends two members to Parliament. It has several inns, which afford good accommodation for travellers; and has a market on Saturday, well stocked with provisions. It is governed by a bailiff, a steward, a recorder, ten approved men, and twenty-two capital burgesses, who yearly choose the bailiff, and he elects two serjeants at mace to attend him. The living is a vicarage, valued at 171 l. 4s. 4d. in the king's books. W. Long. 0. 56. N. Lat. 51. 20.

ANDRADA (Diego de Payva d'), or ANDRADIVS, a learned Portuguese, born at Conimbria, who distinguished himself at the council of Trent, where king Sebastian sent him as one of his divines. There is scarce any Catholic author who has been more quoted by the Protestants than he, because he maintained some opinions a little extravagant concerning the salvation of the Heathens. Andrada was esteemed an excellent preacher. His sermons were published in three parts, the second of which was translated into Spanish by Benedict de Alcoran. Many encomiums have been bestowed upon Andrada. Olorius, in his preface to the "Orthodox Explanations of Andradius," gives him the character of a man of wit, vast application, great knowledge in the languages, with all the

Andes
||
Andrada.

Andrachne zeal and eloquence necessary to a good preacher; and Rosweidus says, that he brought to the council of Trent the understanding of a most profound divine, and the eloquence of a consummate orator.

||
Andrea.

ANDRACHNE, BASTARD ORPINE: A genus of the gynandria order, belonging to the monœcia class of plants; and in the natural method ranking under the 38th order, *Tricocca*. The characters are: The male *calyx* consists of five leaves; the *corolla* has five petals; and the *stamina*, which are also five in number, are inserted into the *stylus*: The female *calyx* is divided into five leaves; there is no *corolla*; the *styli* are three; and the *capsule* is trilocular, containing three seeds.

Species. 1. The telephoides, or herbaceous trailing andrachne, is a low plant, whose branches trail upon the ground. The leaves are small, of an oval shape, smooth, and of a sea-green colour. It is found wild in some parts of Italy and the Archipelago; but is a plant of no great beauty, and therefore seldom cultivated. 2. The fruticosa, or shrubby bastard orpine, is a native of China and some places of America, where it rises 12 or 14 feet high. The leaves are spear-shaped, pointed, and smooth; and under them are produced the footstalks of the flowers, which are small, and of a herbaceous white colour. 3. The arborea, with a tree-like stalk. This species was discovered by the late Dr William Houston, growing naturally at Campeachy. It has a strong woody stem, which rises more than 20 feet high, and sends out many branches on every side. This has not yet flowered in Britain. A fourth sort is also mentioned by Mr Millar as raised by him from seeds sent from Jamaica. It agrees in general with the third sort; but the leaves are somewhat like the laurel, only much larger.

Culture. The first species may be raised, by sowing the seeds in March, on a moderate hot-bed. The plants may be removed into small pots, and plunged into another very moderate hot-bed, to bring them forward; but in mild weather they should have plenty of air admitted to them, and be frequently refreshed with water. In June they will produce flowers, and the seeds will ripen in August and September.—The other species are very tender, and therefore must be kept constantly in the bark-stove. It is very difficult to procure good seeds of these sorts; the covers often containing nothing, though they appear very fair outwardly. Of all the seeds sent over by Dr Houston, only one was found to contain a kernel, so that only one plant was produced.

ANDRAPODISMUS, in ancient writers, the selling of persons for slaves. Hence also *andrapodistes*, a dealer in slaves, more particularly a kidnapper, who steals men or children to sell them; a crime for which the Thessalians were noted.

ANDRAPODOCAPELI, in antiquity, a kind of dealers in slaves. The *andracodocapeli* had a particular process for taking off moles and the like disfigurements on the faces of the slaves they kept for sale, by rubbing them with bran. At Athens, several places in the forum were appointed for the sale of slaves. Upon the first day of every month, the merchants called *Andrapodokapētai* brought them into the market, and exposed them to sale; the crier standing upon a stone erected for that purpose, called the people together.

ANDREA (St), a small village on the Malabar

coast in the East Indies, founded originally by the Portuguese. It takes its name from a church dedicated to St Andrew, and served by the priests of St Thomas.

Andrea,
Andreas.

On the shore of St Andrea, about half a league out in the sea, lies Mud-bay, a place which few in the world can parallel. It is open to the wide ocean, and has neither island nor bank to break the force of the billows, which come rolling with great violence from all parts, in the south-west monsoons: but on this bank of mud they lose themselves in a moment; and ships lie on it as secure as in the best harbour, without motion or disturbance. It reaches about a mile along shore, and has been observed to shift its place from the northward about three miles in 30 years. From St Andrea to Kranganôr, about 12 leagues to the south, the water has the bad property of causing swellings in the legs of those who drink it constantly. Some it affects in one leg, and some in both. It causes no pain, but itching; nor does the swelled leg seem heavier to the owner than the small one, though some have been seen a yard in circumference at the ancle. The Romish legends impute the cause of this distemper (for which no preventative or cure hath been hitherto found) to a curse laid by St Thomas upon his murderers and their posterity; though, according to the Romans themselves, St Thomas was killed by the Tillinga priests at Meliaphûr, on the coast of Coromandel, about 400 miles distant, and where the natives have not this distemper.

ANDREAS (John), a celebrated canonist in the 14th century, was born at Mugello, near Florence; and was professor of canon-law at Padua, Pisa, and afterwards at Bologna. It is said that he macerated his body with fasting; and lay upon the bare ground every night for 20 years together, covered only with the skin of a bear. This is attested by very good authors; but if the story which Poggius tells of him in his jests be true, he must afterwards have relaxed much of this continency: "Joannem Andream, (says he), doctorem Bonnoniensem, cujus fama admodum vulgata est, subagitantem ancillam domesticam uxor deprehendit: re insueta stupefacta mulier in virum versa, Ubi nunc, ait, Joannes, est sapientia vestra? ille nil amplius locutus, In vulva istius, respondit, loco admodum sapientiae accomodato." The French translation of this perhaps will not be displeasing.

*Jean, dit André, fameux Docteur des Loix,
Fut pris un jour aux péchés d'amourette :
Il acolloit une jeune soubrette.
Sa femme vint, fit un signe de croix.
Ho ho, dit elle, est ce vous? non je pense :
Vous, dont par tout on vante la prudence.
Qu'est devenu cet esprit si subtil?
Le bon André, pour suivant son négoce,
Honteux pourtant, ma foi, repondit-il,
Prudence, esprit, tout gist dans cette fosse.*

Since it is agreed that John Andreas had a bastard, this story is at the bottom very probable; and it was perhaps with the mother of Banicontius that his wife found him. Andreas had a beautiful daughter, named *Novella*, whom he loved extremely: and he is said to have instructed her so well in all parts of learning, that when he was engaged in any affair which hindered him from reading lectures to his scholars, he sent his daughter in his room; and lest her beauty should prevent the

at-

Andreas.

attention of the hearers, she had a little curtain drawn before her. To perpetuate the memory of this daughter, he intitled his Commentary upon the Decretals of Gregory IX. the *Novellæ*. He married her to John Calderinus, a learned canonist. The first work of Andreas was his Gloss upon the Sixth Book of the Decretals, which he wrote when he was very young. He wrote also Glosses upon the Clementines; and a Commentary in *regulas Sexti*, which he intitled *Mercuriales*, because he either engaged in it on Wednesdays (*diebus Mercurii*;) or because he inserted his Wednesdays disputes in it. He enlarged the *Speculum* of Durant, in the year 1347. This is all which Mr Bayle mentions of his writings, though he wrote many more. Andreas died of the plague at Bologna, in 1348, after he had been a professor 45 years; and was buried in the church of the Dominicans. Many eulogiums have been bestowed upon him. He has been called *Archidoc-tor decretorum*: In his epitaph, *Rabbi doctorum; lux, censor normaue morum*; "Rabbi of the doctors, the light, censor, and rule of manners:" And it is said, that Pope Boniface called him *lumen mundi*, "the light of the world."

ANDREAS (John) was born a Mahometan, at Xativa in the kingdom of Valencia, and succeeded his father in the dignity of alfaqui of that city. He was enlightened with the knowledge of the Christian religion by being present at a sermon in the great church of Valencia on the day of Assumption of the blessed Virgin, in the year 1487. Upon this he desired to be baptized; and, in memory of the calling of St John and St Andrew, he received the name John Andreas. "Having received holy orders (says he), and, from an alfaqui and a slave of Lucifer, become a priest and minister of Christ; I began, like St Paul, to preach and publish the contrary of what I had erroneously believed and asserted; and, with the assistance of Almighty God, I converted at first a great many souls of the Moors, who were in danger of hell, and under the dominion of Lucifer, and conducted them into the way of salvation. After this, I was sent for by the most catholic princes king Ferdinand and queen Isabella, in order to preach in Granada to the Moors of that kingdom, which their majesties had conquered: by God's blessing on my preaching, an infinite number of Moors were brought to abjure Mahomet, and to turn to Christ. A little after this, I was made a canon by their grace; and sent for again by the most Christian queen Isabella to Arragon, that I might be employed in the conversion of the Moors of those kingdoms, who still persisted in their errors, to the great contempt and dishonour of our crucified Saviour, and the prodigious loss and danger of all Christian princes. But this excellent and pious design of her Majesty was rendered ineffectual by her death." At the desire of Martin Garcia, bishop of Barcelona, he undertook to translate from the Arabic, into the language of Arragon, the whole law of the Moors; and after having finished this undertaking, he composed his famous work of *The Confusion of the Sect of Mahomed*: it contains twelve chapters, wherein he has collected the fabulous stories, impostures, forgeries, brutalities, follies, obscenities, absurdities, impossibilities, lies, and contradictions, which Mahomet, in order to deceive the simple people, has dispersed in the writings of that sect, and especial-

ly in the alcoran, which, as he says, was revealed to him in one night by an angel, in the city of Meke; though in another place he contradicts himself, and affirms that he was 20 years in composing it. Andreas tells us, he wrote this work, that not only the learned amongst Christians, but even the common people, might know the different belief and doctrine of the Moors; and on the one hand might laugh and ridicule such insolent and brutal notions, and on the other might lament their blindness and dangerous condition. This book, which was published at first in Spanish, has been translated into several languages; all those who write against the Mahometans quote it very much.

ANDREINI (Isabella), a native of Padua, was an excellent poetess, and one of the best comedians in Italy, towards the beginning of the 17th century. The Intenti of Pavia thought they did their society an honour by admitting her a member of it; and she, in acknowledgment of this honour, never forgot to mention amongst her titles that of *Academica Infanta*: her titles were these, "Isabella Andreini, comica gelosa, academica infanta, detta l'accessa." She was also a woman of extraordinary beauty; which, added to a fine voice, made her charm both the eyes and ears of the audience. She died of a miscarriage, at Lyons, the 10th of June, 1604, in the 42d year of her age. Her death being a matter of general concern and lamentation, there were many Latin and Italian elegies printed to her memory: several of these pieces were placed before her poems in the edition of Milan, in 1605. Besides her sonnets, madrigals, songs, and eclogues, there is a pastoral of hers intitled *Myrtilla*, and letters, printed at Venice in 1610. She sung extremely well, played admirably on several instruments, understood the French and Spanish languages, and was not unacquainted with philosophy.

ANDRELINUS (Publius Faustus), born at Forli in Italy. He was a long time professor of poetry and philosophy in the university of Paris. Lewis XII. of France made him his poet laureat; and Erasmus tells us he was likewise poet to the queen. His pen was not wholly employed in making verses; for he wrote also moral and proverbial letters in prose, which were printed several times. His poems, which are chiefly in Latin, are inserted in Vol. I. of the *Deliciæ Poetarum Italarum*. Mr De la Monnoie tells us, "that Andrelinus, when he was but 22 years old, received the crown of laurel: That his love-verses, divided into four books, intitled *Livia*, from the name of his mistress, were esteemed so fine by the Roman Academy, that they adjudged the prize of the Latin Elegy to the author." He died in 1518. This author's manner of life was not very exemplary; yet he was so fortunate, says Erasmus, that though he took the liberty of rallying the divines, he was never brought into trouble about it.

ANDREW (St), the apostle, born at Bethsaida in Galilee, brother to Simon Peter. He had been a disciple of John the baptist, and followed Jesus upon the testimony given of him by the baptist, (John i. 30, 37, &c.) He followed our Saviour with another of John's disciples, and went into the house where Jesus lodged; here he continued from about four o'clock in the afternoon till it was night. This was the first disciple whom our Saviour received into his train. Andrew introduced his brother Simon, and they passed a day with

Andreini

||
Andrew.

Andrew, with Christ, after which they went to the marriage in Cana (*id.* ii.). and at last returned to their ordinary occupation. Some months after, Jesus meeting them while they were both fishing together, called them to him, and promised to make them fishers of men. Immediately they left their nets, followed him, (*Matt.* iv. 19.) and never afterwards separated from him.

After our Saviour's ascension, his apostles having determined by lot what parts of the world they should severally take, Scythia and the neighbouring countries fell to St Andrew, who according to Eusebius, after he had planted the gospel in several places, came to Patræ in Achaia, where, endeavouring to convert the proconsul Ægeas, he was by that governor's orders scourged, and then crucified. The particular time of his suffering martyrdom is not known; but all the ancients and modern martyrologies, both of the Greeks and Latins, agree in celebrating his festival upon the 30th of November. His body was embalmed, and decently interred at Patræ by Maximilla, a lady of great quality and estate. Afterwards it was removed to Constantinople by Constantine the Great, and buried in the great church, which he had built to the honour of the apostles. There is a cross to be seen at this day in the church of St Victor at Marseilles, which is believed by the Romanists to be the same that St Andrew was fastened to. It is in the shape of the letter X, and is inclosed in a silver shrine. Peter Chrysologus says, that he was crucified upon a tree; and the spurious Hippolytus assures us it was an olive-tree.

ANDREW, or *Knights of St Andrew*, an order of knights, more usually called the order of the thistle. (See THISTLE.)

Knights of St Andrew, is also an order instituted by Peter the Great of Muscovy in 1698; the badge of which is a golden medal; on one side whereof is represented St Andrew's cross, with these words, *Cesar Pierre monarque de tout le Russie*. This medal, being fastened to a blue ribbon, is suspended from the right shoulder.

St Andrew's Cross, one in form of the letter X. (See CROSS.)

St Andrew's Day, a festival of the Christian church, celebrated on the 30th of November, in honour of the apostle St Andrew.

ANDREW'S (St), a town of Fifeshire in Scotland, once the metropolis of the Pictish kingdom, lying in W. Long. 2. 25. N. Lat. 56. 18. If we may credit legend, St Andrew owes its origin to a singular accident. St Regulus (or St Rule, as he is likewise called), a Greek of Achaia, was warned by a vision to leave his native country, and visit Albion, an isle placed in the remotest part of the world; and to take with him the arm bone, three fingers, and three toes, of St Andrew. He obeyed, and set sail with his companions, but had a very tempestuous passage. After being tossed for some time on a stormy sea, he was at last shipwrecked on the coasts of Otholania, in the territories of Hergustus king of the Picts, in the year 370. On hearing of the arrival of the strangers, with their precious relicts, the king immediately gave orders for their reception, afterwards presenting the saint with his own palace, and building near it the church, which still bears the name of *St Regulus*.

At this time the place was styled *Mucrofs*, or the

land of boars: all round was forest, and the lands bestowed on the Saint were called *Byrebid*. The boars equalled in size the ancient Erymanthian; as a proof of which, two tusks, each sixteen inches long and four thick, were chained to the altar of St Andrew's. St Regulus changed the name to *Kilrymont*; and established here the first Christian priests of the country, called *Culdees*. This church was supreme in the kingdom of the Picts; Ungus having granted to God and St Andrew, that it should be the head and mother of all the churches in his dominions. He also directed that the cross of St Andrew should become the badge of the country. In 518, after the conquest of the Picts, he removed the episcopal see to St Andrew's, and the Bishop was styled *maximus Scotorum Episcopus*. In 1441, it was erected into an archbishopric by Sextus IV. at the intercession of James III. In 1606, the priory was suppressed; and, in 1617, the power of election was transferred to eight bishops, the principal of St Leonard's college, the archdeacon, the vicars of St Andrew's, Leuchars, and Coupar. This see contained the greatest part of the shire of Fife, with a part of Perth, Forfar, and Kincardine shires, and a great number of parishes, churches, and chapels in other dioceses.

The town of St Andrew's was erected into a royal borough by David I. in the year 1140, and their privileges afterwards confirmed. The charter of Malcolm II. is preserved in the tolbooth; and appears written on a bit of parchment, but the contents equally valid with what would at this time require whole skins. Here also are kept the silver-keys of the city; which, for form's sake, are delivered to the king, if he should visit the place, or to a victorious enemy, in token of submission. In this place, likewise, is to be seen the monstrous ax which, in 1646, took off the heads of Sir Robert Spotswood and other distinguished loyalists. The town underwent a siege in 1337; at which time it was possessed by the English, and other partizans of Baliol; but the loyalists, under the Earls of March and Fife, made themselves masters of it in three weeks, by the help of their battering machines.

St Andrew's is now greatly reduced in the number of its inhabitants; at present scarcely exceeding 2000. It is impossible to ascertain the sum when it was the seat of the primate: all that can be known is, that during the period of its splendor, there were between 60 and 70 bakers; but now 9 or 10 are sufficient for the place. It is a mile in circuit, and contains three principal streets. On entering the west port, a well-built street, straight, and of a vast length and breadth, appears; but so grass-grown, and presenting such a dreary solitude, that it forms the perfect idea of having been laid waste by the pestilence.

The cathedral of St Andrew's was founded by Bishop Arnold in 1161, but did not attain its full magnificence till 1318. Its length from east to west was 370 feet; that of the transept, 322. But tho' this vast pile was 157 years in building, John Knox, in June 1559, effected its demolition in a single day; and so effectually has it been destroyed, that nothing now remains but part of the east and west ends, and of the south side.

Near the east end is the chapel of St Regulus; the tower of which is a lofty equilateral triangle, of 20 feet each side, and 103 feet high; the body of the chapel remains,

Andrew's. remains, but the two side-chapels are ruined. The arches of the windows and doors are round, and some even more than semicircles; an undoubted proof of their antiquity.

The priory was founded by Alexander I. in 1122; and the monks (canons regular of St Augustine) were brought from Scone, in 1140, by Robert, Bishop of this see. By an act of parliament, in the time of James I. the prior had precedence of all abbots and priors, and on the days of festival wore a mitre and all episcopal ornaments. Dependent on this priory were those of Lochleven, Portmoak, Monimusk, the Isle of May, and Pittenweem, each originally a seat of the Culdees. The revenues of the house were vast, viz. In money 2237 l. 2 s. 10³ d.; 38 chaldrons, 1 boll, 3 firlots of wheat; 132 ch. 7 bolls of bear; 114 ch. 3 bolls, 1 peck of meal; 151 ch. 10 bolls, 1 firlot, 1 peck and a half of oats; 3 ch. 7 bolls of pease and beans: 480 acres of land also belonged to it. Nothing remains of the priory except the walls of the precinct, which show its vast extent. In one part is a most artless gateway, formed only of seven stones. This inclosure begins near the cathedral, and extends to the shore.

The other religious houses were, one of Dominicans, founded, in 1274, by Bishop Wishart; another of Observantines, founded by Bishop Kennedy, and finished by his successor Patrick Graham in 1478; and, according to some, the Carmelites had a fourth.

Immediately above the harbour stood the collegiate church of Kirk-heugh, originally founded by Constantine III. who, retiring from the world, became here a Culdee. From its having been first built on a rock, it was styled, *Præpositura Sanctæ Mariæ de rupe*.

On the east side of the city are the poor remains of the castle, on a rock overlooking the sea. This fortress was founded, in 1401, by Bishop Trail, who was buried near the high altar of the cathedral, with this singular epitaph:

*Hic fuit ecclesiæ directæ columna, fenestra
Lucida, thuribulum redolens, campana sonora.*

This castle was the residence of cardinal Beaton; who, after the death of George Wishart, apprehending some danger, caused it to be fortified so strongly as to be at that time deemed impregnable. In this fortress, however, he was surprised and assassinated by Norman Lesly with 15 others. They seized on the gate of the castle early in the morning of May 29, 1546; it having been left open for the workmen who were finishing the fortifications: and having placed centinels at the door of the cardinals apartment, they awakened his numerous domestics one by one; and, turning them out of the castle, they without violence, tumult, or offering an injury to any other person, inflicted on Beaton the death he justly merited. The conspirators were immediately besieged in this castle by the regent, Earl of Arran; and notwithstanding they had acquired no greater strength than 150 men, they resisted all his efforts for five months. This, however, was owing to the unskilfulness of the besiegers more than to the strength of the place or the valour of the besieged; for in 1547 the castle was reduced and demolished. The entrance of it is still to be seen; and the window is shown, out of which it is said the cardinal leaned to

glut his eyes with the cruel martyrdom of George Andrew's. Wishart, who was burnt on a spot beneath.

In the church of St Salvator is a most beautiful tomb of Bishop Kennedy, who died, an honour to his family, in 1466. The Gothic work is uncommonly elegant. Within the tomb were discovered six magnificent maces, which had been concealed here in troublesome times. One was given to each of the other three Scotch universities, and three are preserved here. In the top is represented our Saviour; around are angels, with the instruments of the passion.

With these are shown some silver arrows, with large silver plates affixed to them, on which are inscribed the arms and names of the noble youth, victors in the annual competitions in the generous art of archery, which were dropt but a few years ago; and golf is now the reigning game. That sport, and foot-ball, were formerly prohibited, as useless and unprofitable to the public; and at all *weapon schawings*, or reviews of the people, it was ordered, that *fute-ball and golfe be utterly cryed down, and that bow-markes be maid at ilk parish kirk, a pair of butts and schutting be used; and that ilk man schutte sex shottes at least, under the paine to be raiped upon them that cummis not, at least twa pennyes to be given to them that cummis to the bow-markes ta drinke.*

The celebrated university of this city was founded in 1411, by bishop Wardlaw; and the next year he obtained from Benedict III. the bull of confirmation. It consisted once of three colleges. 1. St Salvator's, founded in 1458, by bishop Kenedy. This is a handsome building, with a court or quadrangle within: on one side is the church, on another the library; the third contains apartments for students: the fourth is unfinished. 2. St Leonard's College was founded by prior Hepburn, in 1522. This is now united with the last, and the buildings sold, and converted into private houses. 3. The new, or St Mary's college, was established by archbishop Hamilton in 1553; but the house was built by James and David Bethune, or Beaton, who did not live to complete it. This is said to have been the site of a *schola illustris* long before the establishment even of the university; where several eminent clergymen taught, gratis, the sciences and languages. But it was called the *new college*, because of its late erection into a divinity college by the archbishop.

The university is governed by a chancellor, an office originally designed to be perpetually vested in the archbishops of St Andrew's; but since the reformation, he is elected by the two principals, and the professors of both the colleges.

The rector is the next great officer; to whose care is committed the privileges, discipline, and statutes of the university. The colleges have their rectors, and professors of different sciences, who are indefatigable in their attention to the instructions of the students, and to that essential article their morals. This place possesses several very great advantages respecting the education of youth. The air is pure and salubrious; the place for exercise, dry and extensive; the exercises themselves are healthy and innocent. The university is fixed in a peninsulated country; remote from all commerce with the world, the haunt of dissipation. From the smallness of the society every student's character is perfectly known.

No

Andrew's. No little irregularity can be committed; but it is instantly discovered and checked: vice cannot attain a head in this place, for the incorrigible are never permitted to remain the corrupters of the rest.

The trade of St Andrew's was once very considerable. So late as the reign of Charles I. this place had 30 or 40 trading vessels, and carried on a considerable herring and white fishery, by means of buffes, in deep water; which fisheries had for ages been the grand source of their commerce, wealth, and splendor. After the death of the king, this whole coast, and St Andrew's in particular, became a scene of murder, plunder, and rapine: every town suffered in proportion to its magnitude and opulence. Nor were those hypocritical ruffians satisfied with the shipping, merchandise, plate, cattle, and whatever came within their fight; they also laid the whole coast under contribution. St Andrew's was required to pay 1000 l. but the inhabitants not being able to raise that sum after being thus plundered, the general compounded for 500 l. which was raised by a loan at interest, and hath remained a burden upon the corporation, it is believed, ever since.

The harbour is artificial, guarded by piers, with a narrow entrance, to give shelter to vessels from the violence of a very heavy sea, by the encroachments of which it has suffered much. The manufactures this city might in former times possess, are now reduced to one, that of golf-balls; which, trifling as it may seem, maintains a great number of people. It is, however, commonly fatal to the artists; for the balls are made by stuffing a great quantity of feathers into a leathern case, by help of an iron rod, with a wooden handle, pressed against the breast, which seldom fails to bring on a consumption.

ANDREWS (Lancelot) bishop of Winchester, was born at London in 1555, and educated at Cambridge. After several preferments, he was made bishop, first of Chichester, then of Ely, and, in 1618, was raised to the see of Winchester. This very learned prelate, who was distinguished by his piety, charity, and integrity, may be justly ranked with the best preachers and completest scholars of his age; he appeared to much greater advantage in the pulpit than he does now in his works, which abound with Latin quotations and trivial witticisms. His sermons, though full of puns, were suited to the taste of the times in which he lived, and were consequently greatly admired. He was a man of polite manners and lively conversation; and could quote Greek and Latin authors, or even pun, with king James. There is a pleasant story related of him in the life of Waller the poet. When that gentleman was young, he had the curiosity to go to court, and stood in the circle to see king James dine; where, among other company, there sat at table two bishops, Neale and Andrews. The king proposed aloud this question, Whether he might not take his subjects money when he needed it, without all this formality of parliament? Neale replied, "God forbid you should not; for you are the breath of our nostrils." Whereupon the king turned, and said to the bishop of Winchester, "Well, my lord, what say you?" "Sir (replied the bishop), I have no skill to judge of parliamentary cases." The king answered, "No put-offs, my lord; answer me presently." "Then, Sir (said he), I think it lawful for you to take my brother Neale's money, for he offers it." Mr Wal-

No 20.

ler says, the company was pleased with this answer, Andria but the wit of it seemed to affect the king; for a certain lord coming soon after, his majesty cried out, "O, my lord, they say you lig with my lady." No, Sir (says his lordship, in confusion), but I like her company because she has so much wit." "Why then (says the king) do not you lig with my lord of Winchester there?"—This great prelate was in no less reputation and esteem with King Charles I. than he had been with his predecessors. He died at Winchester-house in Southwark, September 27, 1626, in the 71st year of his age; and was buried in the parish church of St Saviour's, where his executors erected to him a very fair monument of marble and alabaster, on which is an elegant inscription, in Latin, written by one of his chaplains. Mr Milton also, at 17 years of age, wrote a beautiful elegy on his death, in the same language. Bishop Andrews had, 1. A share in the translation of the Pentateuch, and the historical books from Joshua to the first book of Chronicles exclusively. He also wrote, 2. *Tortura Torti*, in answer to a work of cardinal Bellarmine, in which that cardinal assumes the name of Matthew Tortus. 3. A Manual of Private Devotions; and, 4. A Manual of Directions for the Visitation of the Sick; besides the Sermons and Tracts, in English and Latin, published after his death.

ANDRIA, in Grecian antiquity, public entertainments first instituted by Minos of Crete, and, after his example, appointed by Lycurgus at Sparta, at which a whole city or a tribe assisted. They were managed with the utmost frugality, and persons of all ages were admitted, the younger sort being obliged by the law-giver to repair thither as to schools of temperance and sobriety.

ANDRIA, is a city and a bishop's see in the territory of Bari, in the kingdom of Naples. It is pretty large, well peopled, and seated in a spacious plain, four miles from the Adriatic coast. E. Long. 17. 4. N. Lat. 41. 15.

ANDRISCUS, a man of mean extraction, who, pretending to be the son of Perseus last king of Macedonia, took upon him the name of *Philip*, for which reason he was called *Pseudo-Philippus*, the *False Philip*. After a complete victory over Juventus, the Roman Prætor sent against him, he assumed kingly power, but exercised it with vast cruelty. At last, the Romans obliged him to fly into Thrace, where he was betrayed and delivered into the hands of Metellus. This victory gained Macedonia once more into the power of the Romans, and to Metellus the name of *Macedonicus*, but cost the Romans 25,000 men. Andrius adorned the triumph of Metellus, walking in chains before the general's chariot.

ANDROAS, or ANDRODAMAS, among ancient naturalists, a kind of pyritæ, to which they attributed certain magical virtues.

ANDROGEUS, in fabulous history, the son of Minos king of Crete, was murdered by the Athenian youth and those of Megara, who envied his being always victor at the Attic games. But Minos having taken Athens and Megara, obliged the inhabitants to send him an annual tribute of seven young men and as many virgins, to be devoured by the Minotaur; but Theseus delivered them from that tribute.

ANDROGYNES, in natural history, a name given

Andro-
gynes.

ven to those living creatures which, by a monstrous formation of their generative parts, seem (for it is only seeming) to unite in themselves the two sexes, that of the male and of the female. This *lusus naturæ*, this defect, or perhaps redundancy, in the animal-structure, is described by medical authors in the following manner. 'There is a depravation in the structure of the parts intended by nature for propagation, when, besides those concealed parts that are found necessary for the discharge of prolific functions, the *pudenda* of the other sex likewise appear. This monstrous production of nature is diversified in four different ways, of which three appears in males and one in females. In men, the female pudendum, cloathed with hair, sometimes appears contiguous to the perinæum; at other times, in the middle of the scrotum; at other times, which constitutes the third diversity, through that part itself which in the midst of the scrotum, exhibits the form of a pudendum, urine is emitted. Near that part which is the test of puberty, and above the pudendum, even in females, the masculine genitals appear in some, conspicuous in all their three forms, one resembling the *viretram* or yard, the other like the two testicles; but for the most part, it happens, that, of the two instruments of generation, one is feeble and inert; and it is extremely rare that both are found sufficiently valid and proper for feats of love; nay, even in a great many, both these members are deficient and impotent, so that they can perform the office neither of a male nor of a female.'

With respect to them, it appears, from a collation of all the circumstances which have been observed by naturalists worthy of credit, that there is no such thing as a perfect *androgynæ*, or real hermaphrodite; that is to say, a living creature which, by its unnatural, or rather preternatural structure, possesses the genuine powers of both sexes, in such a manner as to be qualified for performing the functions of either with success: the irregularity of their fabrication almost always consists in something superfluous added to one of the two sexes, which gives it the appearance of the other, without bestowing the real and characteristical distinction; and every *hermaphrodite* is almost always a very woman. Since this monstrous exhibition of nature is not such as to abrogate the rights or destroy the character of humanity amongst human beings, this involuntary misfortune implies no right to deprive those upon whom it is inflicted by nature, of the privileges natural to every citizen; and as this deficiency is no more infectious than any other corporeal mutilation, it is not easy to see why marriage should be prohibited to one of these unhappy beings, merely on account of its equivocal appearance, which acts in the character of its prevailing sex. If such a creature, by the defect of its construction, should be barren, this does not infer any right of dissolving the marriage which it may have contracted, more than the same sterility proceeding from any cause whether known or unknown, if his or her consort should not on that account require a divorce. It is only the licentious abuse either of one or the other sex which can be subjected to the animadversion of the police. See HERMAPHRODITE.

Such are the sentiments of the authors of the French Encyclopédie. After all, we cannot forbear to add, that from such heterogeneous matches nature seems to

VOL. I. Part II.

recoil with innate and inextinguishable horror. Nor are any of these invincible aversions implanted in our frame without a final cause worthy of its Author. We would gladly ask these free-thinking gentlemen, In cases where the sexes are so unnaturally confounded, how the police can, by its most severe and rigorous animadversions, either detect or prevent those licentious abuses against which they remonstrate? Since, therefore, an evil so baneful to human society could no otherwise be prevented than by the sanction of nature against such horrible conjunctions, the instinctive antipathy which they inspire was highly worthy of her wisdom and purity.

ANDROGYNES, in ancient mythology, creatures of whom, according to the fable, each individual possessed the powers and characters of both sexes, having two heads, four arms and two feet. The word itself is compounded of two Greek radical words; *ανδρ*, in genitive *ανδρος*, a male, and *γυν*, a female. Many of the rabbinical writers pretend, that Adam was created double, one body being male, the other female, which in their origin not being essentially joined, God afterwards did nothing but separate them.

The gods, says Plato in his *Banquet*, had formed the structure of man round, with two bodies and two sexes. This fantastic being, possessing in itself the whole human system, was endowed with a gigantic force, which rendered it insolent, insomuch that it resolved to make war against the gods. Jupiter, exasperated, was going to destroy it; but, sorry at the same time to annihilate the human race, he satisfied himself with debilitating this double being, by disjoining the male from the female, and leaving each half to subsist with its own powers alone. He assigned to Apollo the task of repolishing these two half bodies, and of extending their skins so that the whole surface might be covered. Apollo obeyed, and fastened it at the *umbilicus*. If this half should still rebel, it was once more to be subdivided by another section, which would only leave it one of the parts of which it was then constituted; and even this fourth of a man was to be annihilated, if it should persist in its obstinacy and mischief. The idea of these *androgynes* might well be borrowed from a passage in Moses, where that historian of the birth and infancy of nature describes Adam as calling Eve *bone of his bone* and *flesh of his flesh*. However this may be, the fable of Plato has been used with great ingenuity by a French poet, who has been rendered almost as conspicuous by his misfortunes as by his verses. With the ancient philosopher, he attributes the propensity which attracts one of the sexes towards the other, to the natural ardour which each half of the *androgynes* feels for reunion; and their inconstancy, to the difficulty which each of the separated parts encounters in its efforts to recover its proper and original half. If a woman appears to us amiable, we instantly imagine her to be that moiety with whom we should only have constituted one whole, had it not been for the insolence of our original double-sexed progenitor.

The heart, with fond credulity impress'd,
Tells us the half is found, and hopes for rest;
But 'tis our curse, that sad experience shows,
We neither find our half, nor gain repose.

ANDROGYNOUS, in zoology, an appellation given to animals which have both the male and female

5 G.

sex.

Andro-
gynes,
Androgy-
nous.

Androides. sex in the same individual.—In botany, the term is applied to such plants as bear both male and female flowers on the same root.

ANDROIDES, in mechanics, a human figure, which, by certain springs or other movements, is capable of performing some of the natural motions of a living man. The motions of the human body are more complicated, and consequently more difficult to be imitated, than those of any other creature; whence the construction of an *androides*, in such a manner as to imitate any of these actions with tolerable exactness, is justly supposed to indicate a greater skill in mechanics than any other piece of workmanship whatever.

A very remarkable figure of this kind appeared in Paris, in the year 1738. It represented a flute player, and was capable of performing many different pieces of music on the German-flute; which, considering the difficulty of blowing that instrument, the different contractions of the lips necessary to produce the distinctions between the high and low notes, and the complicated motions of the fingers, must appear truly wonderful.

This machine was the invention of M. Vaucanson, member of the Royal Academy of Sciences; and a particular description of it was published in the *Memoirs of the Academy* for that year.

The figure itself was about five feet and an half in height, situated at the end of an artificial rock, and placed upon a square pedestal four feet and an half high and three and an half broad. The air entered the body by three pipes separated one from the other. It was conveyed to them by nine pair of bellows, three of which were placed above and six below. These were made to expand and contract regularly in succession, by means of an axis of steel turned round by some clock-work. On this axis were different protuberances at proper distances, to which were fixed cords thrown over pulleys, and terminating in the upper boards of the bellows, so that, as the axis turned, these boards were alternately raised and let down. A contrivance was also used to prevent the disagreeable hissing fluttering noise usually attending the motion of bellows. This was by making the cord, by which the bellows was moved, press, in its descent, upon one end of a smaller lever, the other end of which ascending forced open the small leathern valve that admitted the air, and kept it so, till, the cord being relaxed by the descent of the upper board, the lever fell, and the air was forced out. Thus the bellows performing their functions constantly without the least hissing or other noise, by which it could be judged in what manner the air was conveyed to the machine. The upper boards of three of the pairs of bellows were pressed down by a weight of four pounds, that of three others by a weight of two pounds, and those of the three remaining ones by nothing but their own weight.

The three tubes, by which the air entered, terminated in three small reservoirs in the trunk of the figure. There they united, and, ascending towards the throat, formed the cavity of the mouth, which terminated in two small lips adapted in some measure to perform their proper functions. Within this cavity also was a small moveable tongue, which by its play, at proper periods, admitted the air, or intercepted its passage to the flute.

The fingers, lips, and tongue, received their proper directions by means of a steel cylinder turned by

clock-work. It was divided into 15 equal parts, which, by means of pegs pressing upon the ends of 15 different levers, caused the other extremities to ascend. Seven of these levers directed the fingers, having wires and chains affixed to their ascending extremities, which being attached to the fingers, caused them ascend in proportion as the other extremity was pressed down by the motion of the cylinder, and *vice versa*. Thus the ascent or descent of one end of a lever produced a similar ascent or descent in the corresponding finger, by which one of the holes of the flute was occasionally opened or stopped, as by a living performer. Three of the levers served to regulate the ingress of the air, being contrived so as to open and shut, by means of valves, the three reservoirs of air above mentioned, so that more or less strength might be given, and a higher or lower note produced, as occasion required. The lips were, by a similar mechanism, directed by four levers, one of which opened them to give the air a freer passage; the other contracted them; the third drew them backward, and the fourth pushed them forward. The lips were projected upon that part of the flute which receives the air; and, by the different motions already mentioned, modified the tone in a proper manner.—The remaining lever was employed in the direction of the tongue, which it easily moved so as to shut or open the mouth of the flute.

Thus we see how all the motions necessary for a German flute player could be performed by this machine; but a considerable difficulty still remains, namely, how to regulate these motions properly, and make each of them follow in just succession. This, however, was effected by the following simple method. The extremity of the axis of the cylinder was terminated on the right side by an endless screw, consisting of twelve threads, each placed at the distance of a line and an half from the other. Above this screw was fixed a piece of copper, and in it a steel pivot, which, falling in between the threads of the screw, obliged the cylinder to follow the threads, and, instead of turning directly round, it was continually pushed to one side. Hence, if a lever was moved, by a peg placed on the cylinder, in any one revolution, it could not be moved by the same peg in the succeeding revolution, because the peg would be moved a line and an half beyond it by the lateral motion of the cylinder. Thus, by an artificial disposition of these pegs in different parts of the cylinder, the statue was made, by the successive elevation of the proper levers, to exhibit all the different motions of a flute-player, to the admiration of every one who saw it.

The construction of machines capable of imitating even the mechanical actions of the human body, show exquisite skill; but what shall we say of one capable, not only of imitating actions of this kind, but of acting as external circumstances require, as though it were endowed with life and reason? This, nevertheless, has been done. M. de Kempelen, a gentleman of Presburg in Hungary, excited by the performances of M. de Vaucanson, at first endeavoured to imitate them, and at last far excelled them. This gentleman constructed an *Androides* capable of playing at chess!—Every one who is in the least acquainted with this game must know, that it is so far from being mechanically performed, as to require a greater exertion of the judgment

Fig. 3.
Anemometer.

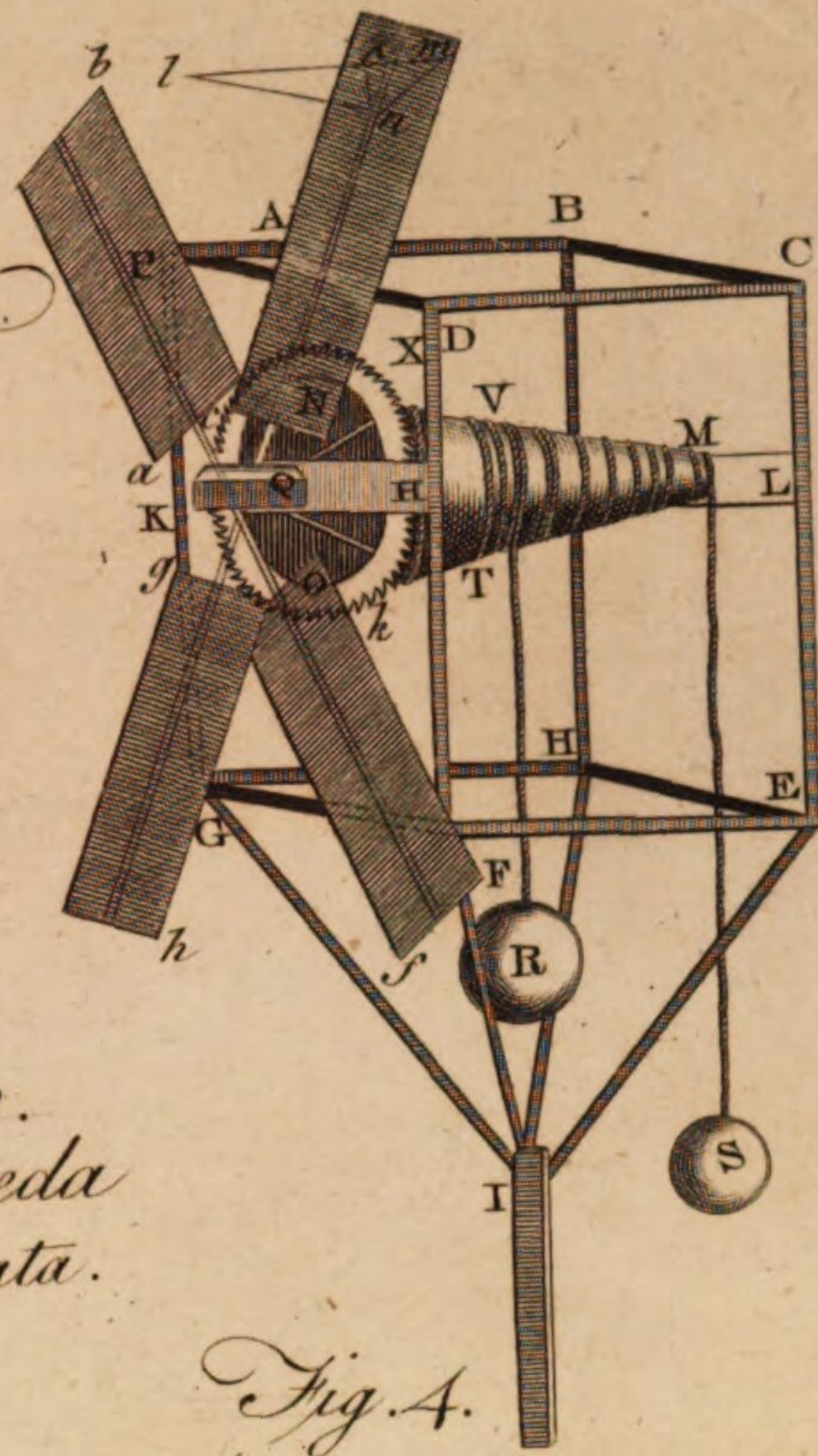
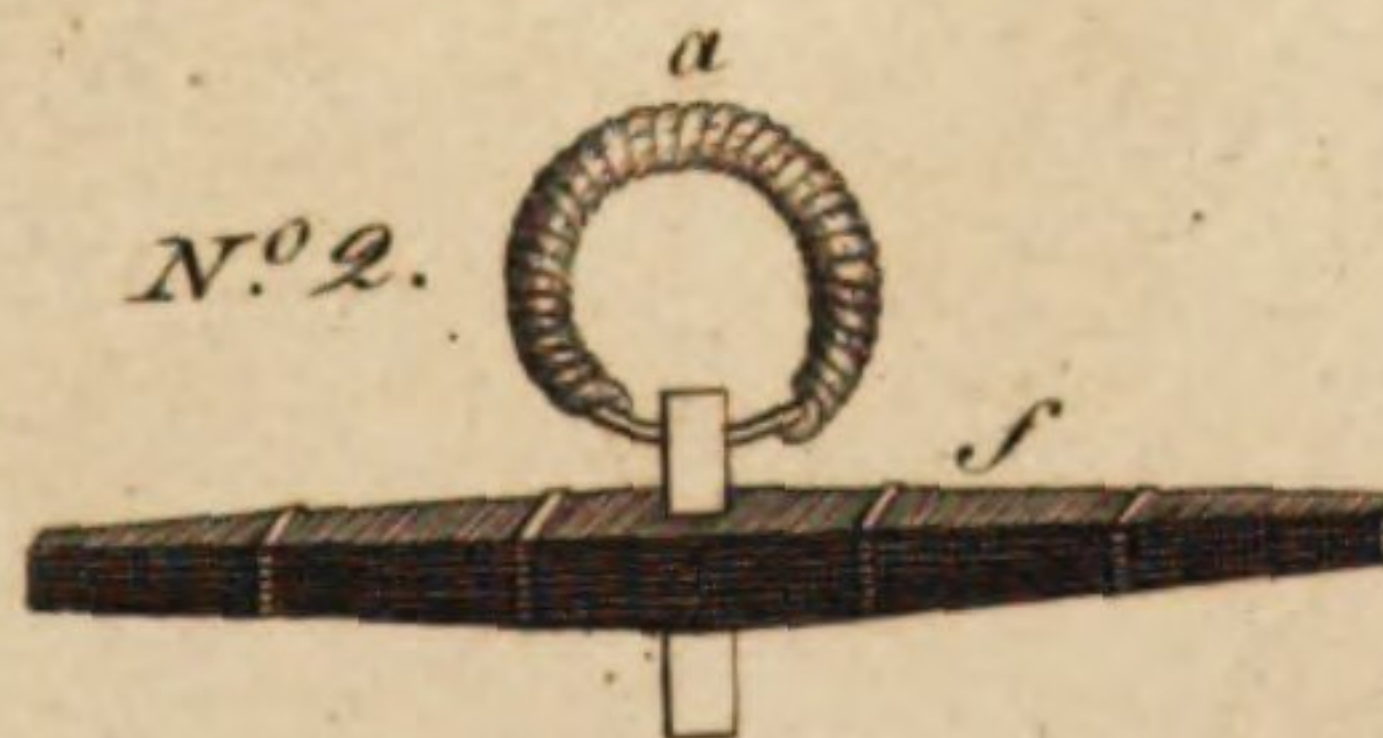


Fig. 5.
Anguis Ventralis.
or Glass Snake.



Fig. 2.
Andromeda
Paniculata.

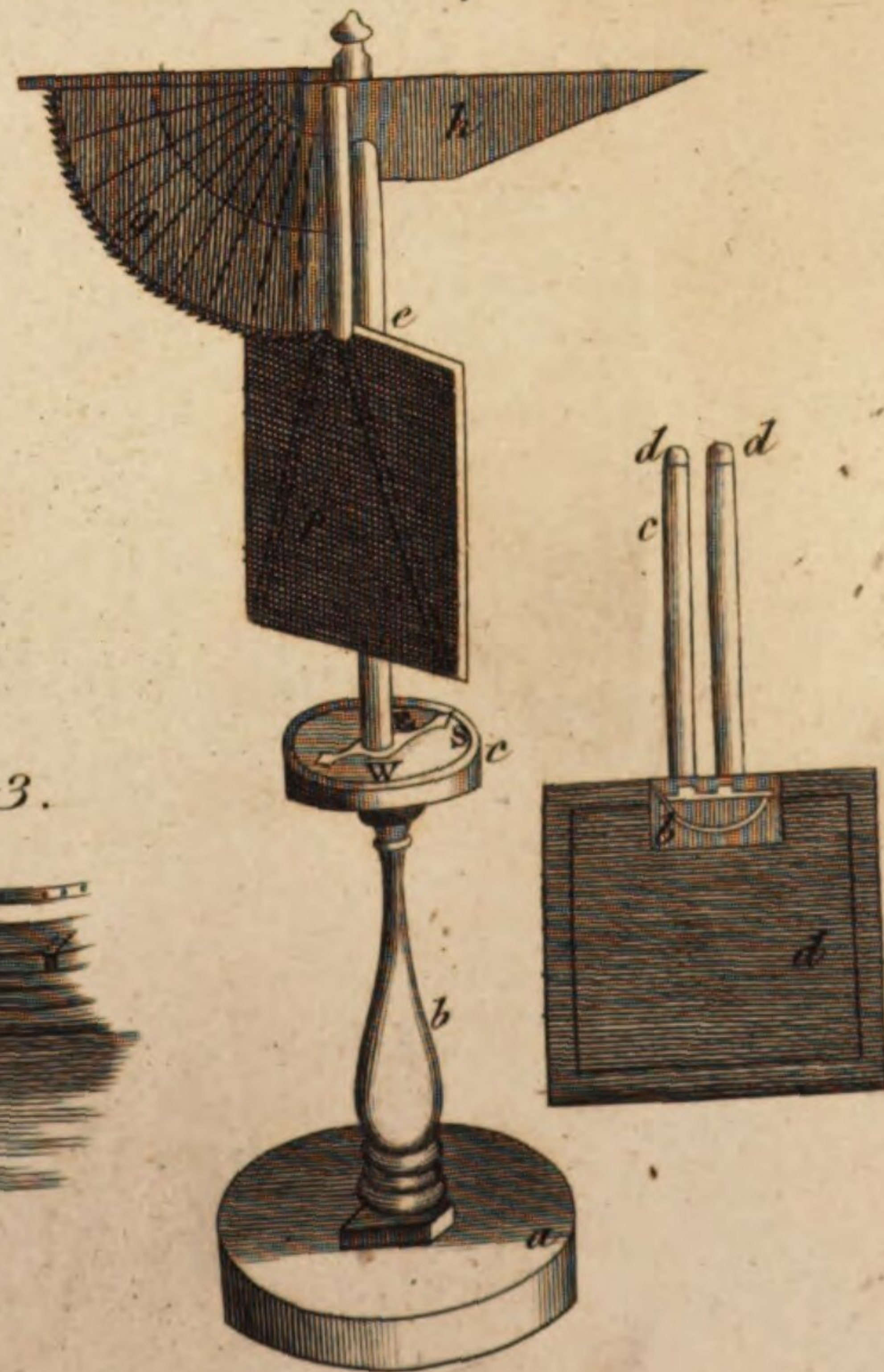
Fig. 1.
Anchor.



N° 3.



Fig. 4.
Anemoscope.



A. Bell Pin. Wal. Sculptor fecit.

Androides. ment and rational faculties than is sufficient to accomplish many matters of greater importance. An attempt therefore to make a wooden chess-player, must appear as ridiculous as to make a wooden preacher or counsellor of state. That this machine really was made, however, the public have had ocular demonstration. The inventor came over to Britain in 1783, where he remained above a year with his automaton.

It is a figure as large as life, in a Turkish dress, sitting behind a table with doors, of three feet and a half in length, two in depth, and two and a half in height. The chair on which it sits is fixed to the table, which runs on four wheels. The automaton leans its right arm on the table, and in its left hand holds a pipe: with this hand it plays after the pipe is removed. A chess board of 18 inches is fixed before it. This table, or rather cupboard, contains wheels, levers, cylinders, and other pieces of mechanism; all which are publicly displayed. The vestments of the automaton are then lifted over its head, and the body is seen full of similar wheels and levers. There is a little door in its thigh, which is likewise opened; and with this, and the table also open, and the automaton uncovered, the whole is wheeled about the room. The doors are then shut, and the automaton is ready to play; and it always takes the first move.

At every motion, the wheels are heard; the image moves its head, and looks over every part of the chess-board. When it checks the queen, it shakes its head twice, and thrice in giving check to the king. It likewise shakes its head when a false move is made, replaces the piece, and makes its own move; by which means the adversary loses one.

Mr de Kempelen remarks as the most surprising circumstance attending his automaton, that it had been exhibited at Presburg, Vienna, Paris and London, to thousands, many of whom were mathematicians and chess-players, and yet the secret by which he governed the motion of its arm was never discovered. He prided himself solely on the construction of the mechanical powers, by which the arm could perform ten or twelve moves. It then required to be wound up like a watch, after which it was capable of continuing the same number of motions.

The automaton could not play unless Mr de Kempelen or his substitute was near it to direct its moves. A small square box, during the game, was frequently consulted by the exhibitor; and herein consisted the secret, which he said he could in a moment communicate. He who could beat Mr de Kempelen was, of course, certain of conquering the automaton. It was made in 1769. His own account of it was: "C'est une bagatelle qui n'est pas sans merite du côté du mécanisme, mais les effets n'en paroissent si merveilleux que par la hardiesse de l'idée, & par l'heureux choix des moyens employés pour faire illusion."

The strongest and best armed loadstone was allowed to be placed on the machine by any of the spectators.

As the inventor of this admirable piece of mechanism hath not yet thought proper to communicate to the public the means by which it is actuated, it is in vain for any, except those who are exquisitely skilled in mechanics, to form conjectures concerning them.—Many other curious imitations of the human body, as well as that of other animals, have been exhibited, though none

of them equal to the last mentioned one. See the article **Androlepsy** **AUTOMATON.**

ANDROLEPSY, in Grecian antiquity, an action allowed by the Athenians against such as protected persons guilty of murder. The relations of the deceased were empowered to seize three men in the city or house whither the malefactor had fled, till he were either surrendered, or satisfaction made some way or other for the murder.

ANDROMACHE, the wife of the valiant Hector, the mother of Astyanax, and daughter of Eton king of Thebes in Cilicia. After the death of Hector and the destruction of Troy, she married Pyrrhus, and afterwards Helenus the son of Priam, with whom she reigned over part of Epirus.

ANDROMEDA, in astronomy, a northern constellation, behind Pegasus, Cassiopeia, and Perseus. It represents the figure of a woman chained; and is fabled to have been formed in memory of Andromeda, daughter of Cepheus and Cassiopeia, the wife of Perseus, by whom she had been delivered from a sea monster, to which she had been exposed to be devoured for her mother's pride. Minerva translated her into the heavens.

The stars in the constellation Andromeda in Ptolemy's catalogue are 23, in Tycho's 22, in Bayer's 27, in Mr Flamsteed's no less than 84.

ANDROMEDA, the name of a celebrated tragedy of Euripides, admired by the ancients above all the other compositions of that poet, but now lost.

It was the representation of this play, in a hot summer day, that occasioned that epidemic fever, or phrenzy, for which the Abderites are often mentioned, wherein they walked about the streets, rehearsing verses, and acting parts of this piece. See **ABDERA**.

ANDROMEDA, or *Mayb Cystus*: A genus of the monogynia order, belonging to the decandria class of plants; and in the natural method ranking under the 18th order, *Bicornes*. The characters are: The calyx is a quinquepartite perianthium, small, coloured, and persistent: The corolla is monopetalous, campanulate, and quinquefid, with reflected divisions: The stamina consist of ten subulated filaments, shorter than the corolla; the antheræ two horned and nodding: The pistillum has a roundish germen; a cylindric stylus larger than the stamina, and persistent; and an obtuse stigma: The pericarpium is a roundish five-cornered capsule, with five cells and five valves: The seeds are very numerous, roundish and glossy.

Species. 1. The *polifolia* is a low plant, growing naturally in bogs in the northern countries. It is difficultly preserved in gardens; and being a plant of no great beauty, is seldom cultivated. 2. The *mariana*, a native of North America. It is a low shrub, sending out many woody stalks from the root, which are garnished with oval leaves placed alternately; the flowers are collected in small bunches, are of an herbaceous colour, and shaped like those of the strawberry-tree. They appear in June and July. 3. The *paniculata** is a native of Virginia and Carolina, growing in moist places. The plants usually arrive at the height of ten feet, with thin leaves set alternately, and having their edges finely serrated. The flowers are tubulous, small, and of a greenish white, closely set horizontally on one side of the slender stalks. These flowers are succeeded by berries, which open when ripe; and divide into five sections,

Androlepsy
||
Andromeda.

Andromeda tions, inclosing many small seeds. 4. The arborea is a native of the same countries, where it is called the *Androna. sorrel-tree*. It grows to the height of 20 feet, with a trunk usually five or six inches thick. The branches are slender, thick set with leaves like those of the pear-tree. From the ends of the branches proceed many slender stalks, on one side of which hang many small white flowers like those of the strawberry tree. 5. The *calyculata* is a native of Siberia, and likewise of North America. It grows on mossy land, and is therefore very difficult to keep in gardens. The leaves are shaped like those of the box-tree, and are of the same consistence, having several small punctures on them. The flowers grow in short spikes from the extremity of the branches. They are produced single between two leaves, are of a white colour, and a cylindrical or pitcher-like shape. There are ten other species.

Propagation and culture. All these sorts, except four, are hardy plants. The fourth species requires to be sheltered from frost in winter, but in the summer should be frequently watered.

The above plants succeed best upon boggy and moist grounds. You must procure the seeds from the places where they grow naturally; a year before which a boggy or the moistest part of your garden should be dug, and the roots of all weeds cleared off. As the weeds begin to rise, so constantly should the ground be again dug, and sea or drift sand should be plentifully mixed with the natural soil. By this management, till the seeds arrive, the ground being made tolerably fine, the seeds should be sown very shallow in the moist or boggy land; or if the land should be so boggy that it cannot be easily worked so as to be proper for the reception of the seeds, then let a sufficient quantity of soil from a fresh pasture, mixed with drift sand, be laid over the bog, and let the seeds be sown therein. The bog will in time absorb this soil, but the seeds will come up; and this is the most effectual method of procuring plants of this kind from seeds. The first year after they come up they should be shaded in very hot weather; and after that they will require little or no care. Another method of increasing these shrubs, is by layers or suckers; so that whoever has not the convenience of procuring the seeds from abroad, should get a plant or two of the sort he most likes. These he should plant in a boggy situation, and in a very little time he will have increase enough; for they throw out suckers in prodigious plenty, and, if they like the situation, to a great distance. These may be taken off, and planted where they are to remain.

ANDRON, in Grecian antiquity, denotes the apartment in houses designed for the use of men; in which sense it stands opposed to *Gynæceum*.—The Greeks also gave their dining-rooms the title of *andron*, because the women had no admittance to feasts with the men.

ANDRONA, in ancient writers, denotes a street, or public place, where people met and conversed together. In some writers, *androna* is more expressly used for the space between two houses; in which sense the Greeks also use the term *ανδρωνας*, for the way or passage between two apartments.

ANDRONA is also used, in ecclesiastical writers, for that part in churches destined for the men. Anciently it was the custom for the men and women to have sepa-

rate apartments in places of worship, where they performed their devotions asunder; which method is still religiously observed in the Greek church. The *ανδρων*, or *androna*, was in the southern side of the church, and the womens apartment on the northern.

ANDRONICUS I. emperor of the East, caused Alexius II. who had been put under his care, to be strangled, and then took possession of the throne of Constantinople in 1183: but the people, becoming exasperated at his cruelties, proclaimed Isaac Angeleus emperor, and put Andronicus in irons: they then thrust out his eyes; and having led him through the city in an ignominious manner, hanged him.

ANDRONICUS of Cyrrhus, built at Athens an octagon tower, with figures carved on each side, representing the eight principal winds. A brass triton at the summit, with a rod in its hand, turned round by the wind, pointed to the quarter from whence it blew. From this model is derived the custom of placing weather-cocks on steeples.

ANDROPHAGI, in ancient geography, the name of a nation whose country, according to Herodotus, was adjacent to Scythia. Their name, compounded of two Greek words, signifies *man-eaters*. Herodotus does not inform us whether their manner of subsisting corresponded with their name; whether they were so savage as to eat human flesh. See the article ANTHROPOPHAGI. They are represented, however, as the most barbarous and fierce of all nations. They were not governed by laws; the care of their cattle was their chief employment. Their dress was like that of the Scythians; and they had a language peculiar to themselves.

ANDROPOGON, or MAN'S-BEARD, in botany:

A genus of the monœcia order, belonging to the polygamia class; and in the natural method ranking under the 4th order, *Gramina*. The *hermaphrodite* calyx is a one-flowered bivalved glume: The *corolla* is a bivalved glume awn'd at the base: The *stamina* consist of three capillary filaments; the antheræ are oblong and bifurcated: The *pistillum* has an oval germen; with two capillary styli coalesced, and villous stigmata: There is no *pericarpium*: The *seed* is one, solitary, and covered. The *male* calyx, corolla and stamina, the same with the hermaphrodite; but the corolla without the awn.—There are above 18 species. Of these the most remarkable is the nardus, which produces the Indian nard or spikenard of the shops. The spikenard, as brought from the East Indies, is a congeries of small fibres issuing from one head, and matted close together, so as to form a bunch about the size of the finger, with some small strings at the opposite end of the head. The matted fibres (which are the parts chosen for medicinal purposes) are supposed by some to be the head or spike of the plant, by others the root: they seem rather to be the remains of the withered stalks, or the ribs of the leaves: sometimes entire leaves and pieces of stalks are found among them: we likewise now and then meet with a number of these bunches issuing from one root. Spikenard has a warm, pungent, bitterish taste; and a strong not very agreeable smell. It is stomachic and carminative; and said to be alexipharmac, diuretic and emmenagogue; but at present it is very little employed.

ANDROS, one of the ancient Cyclades, lying between

Andronicus
Andros.

Andros.

tween Tenedos and Eubœa : being one mile distant from the former, and ten from the latter. The ancients gave it various names, viz. Cauros, Lafia, Nonagria, Epagris, Antandros, and Hydrusia. The name of *Andros* is received from one Andreus, appointed, according to Diodorus Siculus, by Rhadamanthus, one of the generals, to govern the Cyclades, after they had of their own accord submitted to him. As to the name of *Antandros*, the same author tells us, that Ascanius the son of Æneas being taken prisoner by the Pelagians, gave them this island for his ransom, which on that account was called *Antandros*, or 'delivered for one man.' The name of *Hydrusia* it obtained in common with other places well supplied with water. It had formerly a city of great note, bearing the same name, and situated very advantageously on the brow of a hill, which commanded the whole coast. In this city, according to Strabo and Pliny, stood a famous temple dedicated to Bacchus. Near this temple, Mutianus, as quoted by Pliny, tells us, there was a spring called the *gift of Jupiter*; the water of which had the taste of wine in the month of January, during the feasts of Bacchus which lasted seven days. The same author adds, that the waters, if carried to a place whence the temple could not be seen, lost their miraculous taste. Pausanias makes no mention of this spring; but says, that, during the feast of Bacchus, wine flowed, or was at least by the Andrians believed to flow, from the temple of that god. The priests, no doubt, found their account in keeping up this belief, by conveying, through secret conduits, a great quantity of wine into the temple.

The Andrians were the first of all the islanders who joined the Persians at the time Xerxes invaded Greece; and therefore Themistocles, after the victory at Salamis, resolved to attack the city of Andros, and oblige the inhabitants to pay large contributions for the maintenance of his fleet. Having landed his men on the island, he sent heralds to the magistrates, acquainting them, that the Athenians were coming against them with two powerful divinities, *persuasion and force*; and therefore they must part with their money by fair means or foul. The Andrians replied, that they likewise had two mighty deities, who were very fond of their island, viz. *poverty and impossibility*; and therefore could give no money. Themistocles, not satisfied with this answer, laid siege to the town; which he probably made himself master of and destroyed, as we are informed by Plutarch, that Pericles, a few years after, sent thither a colony of 250 Athenians. It was, however, soon retaken by the Persians; and, on the overthrow of that empire by Alexander the Great, submitted to him, along with the other islands. On his death it sided with Antigonus, who was driven out by Ptolemy. The successors of the last mentioned prince held it to the times of the Romans; when Attalus, king of Pergamus, besieged the metropolis at the head of a Roman army; and, having taken it, was by them put in possession of the whole island. Upon the death of Attalus, the republic claimed this island, as well as his other dominions, in virtue of his last will.

Andros is now subject to the Turks; and contains a town of the same name, with a great many villages. It is the most fruitful island in all the Archipelago, and yields a great quantity of silk. There are said to be

about 6000 inhabitants, besides those of the villages Arni and Amoldeos, who are about two hundred, have a different language and customs, and are called *Albanois*. There are seven monasteries, a great number of churches, and a cathedral for the bishops of the Roman Catholic persuasion; but most of the inhabitants are of the Greek communion. The Jesuits had a house and a church in this island; but they were forced to quit them long ago. Here are some delightful valleys; but the air is bad, and the water of the city worse. The women would be agreeable enough, if it was not for their dress, which is very unbecoming; for they stuff out their clothes without the least regard to their shape: but the Albanese women make a much better appearance. The peasants make wicker baskets, wherewith they supply the greatest part of the Archipelago. They have all sorts of game in the woods and mountains, but know not how to take them for want of guns. Their principal food is goats flesh; for there is no fish to be met with on their coasts. When they are sick, they are obliged to let the disease take its natural course, having neither physician nor surgeon on the island. A *cadi*, assisted by a few of the principal persons of the island, has the management of civil affairs, and his residence is in the castle: an *aga*, who presides over the military force, lives in a tower without the city. About two miles from the present town are still to be seen the ruins of a strong wall with the fragments of many columns, chapiters, bases, broken statues, and several inscriptions, some of which mention the senate and people of Andros, and the priests of Bacchus; from which it is probable, that this was the site of the ancient city. E. Long. 25. 30. N. Lat. 37. 50.

ANDROS (anc. geog.), an island in the Irish sea (Pliny), called *Hedros* by Ptolemy: Now *Bardsey*, distant about a mile from the coast of North Wales.

ANDROSACE: A genus of the monogynia order belonging to the pentandria class of plants; and in the natural method ranking under the 21st order, *Preciæ*. The essential characters are, The *male* calyx is five-leav'd; the corolla is five-petal'd; the stamina are five, inserted on the rudiment of the stylus: The *female* calyx is five-leav'd; the corolla is wanting; the styli are three; the capsule is trilocular; the seeds are two. Of this genus Dr Linnaeus reckons six.

Species. 1. The maxima grows naturally in Austria and Bohemia, among the corn. It hath broad leaves, which spread near the ground; from the centre of these the footstalks arise, which are terminated by an umbel of white flowers like those of the auricula. These appear in April and May, and the seeds ripen in June; soon after which the plants perish. 2. The septentrionalis, villosa, carnea, and lactea, grow naturally on the Alps and Helvetian mountains, as also in Siberia. They are much smaller than the former, seldom growing more than three inches high. Of the other species called the *elongata*, we have no particular description.

Culture. These plants are propagated by seeds, which should be sown soon after they are ripe, otherwise they seldom come up the same year. If permitted to scatter, they will grow better than when they are sown.

ANDRUM, a kind of Hydrocele, to which the people of Malabar are very subject.—Its origin is derived from the vitious quality of the country waters, impregnated

Andros

Andrum.

Andryala nated with corrosive muriatic salts, the source of most other diseases that infect the Malabarians. Its signs, or symptoms, are an erysipelas of the scrotum, returning every new moon, by which the lymphatics, being eroded, pour a serous saline humour into the cavity of the scrotum. The andrum is incurable; those once seized with it have it for life: but it is not dangerous, nor very troublesome, to those used to it; tho' sometimes it degenerates into an hydroscrocele. The method of prevention is by a heap of sand fetched from a river of the province Mangatti, and strowed in the wells. This is practised by the rich. As to the cure, they have only a palliative one; which is by incision, or tapping, and drawing off the water from the scrotum, once in a month or two.

ANDRYALA, Downy sow thistle: A genus of the polygamia æqualis order belonging to the syn-genesia class of plants; and in the natural method ranking under the 49th order, *Composita-femiflosculus*. The essential characters are: The receptacle is villous; the calyx is many parted, subequal, and rounded; and the pappus is simple and sessile.

Species. 1. The integrifolia is an annual plant, growing naturally in the south of France, Spain, and Italy. It rises to the height of a foot and an half, with woolly branching stalks. The flowers are produced in small clusters at the top of the stalks. They are yellow, and like those of the sow-thistle; so do not make any great appearance. 2. The ragulina is a native of the Cape of Good Hope. The leaves are extremely white, and much indented on their edges. The flower-stalks grow about a foot high, having small clusters of yellow flowers, which appear in July. The seeds sometimes ripen in Britain, but not always. 3. The lanata is a native of Sicily and of the country round Montpellier. The lower leaves are indented and woolly, but those on the stalks are entire. It seldom rises more than a foot high, supporting a few yellow flowers at top. 4. The sinuata grows in Spain and Portugal: the leaves are broader, longer, and more downy, than either of the other sorts; the flower-stalks rising more than a foot high. They branch into several foot-stalks, each sustaining one large yellow flower, shaped like those of hawkweed, which are succeeded by oblong black seeds covered with down.

Culture. All these plants are easily propagated by seeds, which should be sown in autumn, where they are to remain, and will require no other culture than to thin them where they are too close, and to keep them free from weeds. The third sort must have a light dry soil, or it will not live in this country.

ANDUXAR, a city in the province of Andalusia, in Spain, seated on the Guadalquivir. It is pretty large, indifferently rich, and defended by a good castle. It is adorned with handsome churches and several religious houses, and inhabited by many families of high rank. The land about it abounds in corn, wine, oil, honey, and fruit of all sorts; and the inhabitants carry on a considerable trade in silk. W. Long. 4. 2. N. Lat. 37. 45.

ANDUZE, a town of France in lower Languedoc, seated on the river Gardon. It carries on a considerable trade in serges and woollen cloth. E. Long. 3. 42. N. Lat. 43. 39.

ANEAU (Bartholomew), a native of Bourges in France, a man of eminent learning in the 16th century, educated under Melchior Volmar. He was professor at Lyons, where he propagated the doctrines of the Reformation secretly for a long time: but on the festival of the Holy Sacrament 1565, as the procession was passing on towards the college, there was a large stone thrown from one of the windows upon the Host and priest who carried it. The people, enraged at this, broke into the college, and assassinated Mr Aneau, whom they imagined to have been the occasion, and the college itself was shut up next day by order of the city.

ANECDOTE, **ANECDOTA**, a term used by some authors, for the titles of *Secret Histories*; but it more properly denotes a relation of detached and interesting particulars. The word Greek is *anecdota*, q. d. *things not yet known or hitherto kept secret*. Procopius gives this title to a book which he published against Justinian and his wife Theodora; and he seems to be the only person among the ancients who has represented princes such as they are in their domestic relation.—Varillas has published *Anecdotes of the House of Medicis*.

ANECDOTES is also an appellation given to such works of the ancients as have not yet been published. In which sense, M. Muratori gives the name *Anecdota Græca* to several writings of the Greek fathers, found in the libraries, and first published by him.—F. Martene has given a *Thesaurus Anecdotorum Novus*, in folio, 5 vols.

ANEE, in commerce, a measure for grain, used in some provinces of France. At Lyons, it signifies also a certain quantity of wine, which is the load an ass can carry at once; which is fixed at 80 English quarts, wine measure.

ANEMOMETER, in mechanics, implies a machine for measuring the force and velocity of the wind.

Various machines of this kind have been invented at different times, and by different persons. The following has been often experienced, and found to answer the intention.

An open frame of wood, ABCDEFGHI*, is supported by the shaft or arbor I. In the two cross-pieces HK, LM, is moved a horizontal axis QM, by means of the four sails, *ab*, *cm*, *Of*, *gb*, exposed to the wind in a proper manner. Upon this axis is fixed a cone of wood, MNO; upon which, as the sails move round, a weight R, or S, is raised by a string round its superficies, proceeding from the smaller to the larger end NO. Upon this larger end or base of the cone, is fixed a rocket wheel *k*, in whose teeth the click X falls, to prevent any retrograde motion from the depending weight.

The structure of this machine sufficiently shows that it may be accommodated to estimate the variable force of the wind; because the force of the weight will continually increase as the string advances on the conical surface, by acting at a greater distance from the axis of motion; consequently, if such a weight be added on the smaller part M, as will just keep the machine in equilibrio in the weakest wind, the weight to be raised, as the wind becomes stronger, will be increased in proportion, and the diameter of the cone NO may be

Aneau
||
Anemometer.

* Plate
XXIX.
fig. 3.

Anemone.

be so large in comparison to that of the smaller end at M, that the strongest wind shall but just raise the weight at the greater end.

If, for example, the diameter of the axis be to that of the base of the cone NO as 1 to 28; then, if S be a weight of one pound at M on the axis, it will be equivalent to 28 pounds when raised to the greater end: if therefore, when the wind is weakest, it supports one pound on the axis, it must be 28 times as strong to raise the weight to the base of the cone. If therefore a line of scale of 28 equal parts be drawn on the side of the cone, the strength of the wind will be indicated by that number on which the string rests.

ANEMONE, WIND-FLOWER: A genus of the polygynia order, belonging to the polyandria class of plants; and, in the natural method, ranking under the 26th order, *Multiflora*. It has its name from the Greek *ανεμος*, signifying the wind; because the flower is supposed not to open unless the wind blows.—The characters are: There is no *calyx*: The *corolla* consists of petals of two or three orders, three in each series, oblongish: The stamina consist of numerous capillary filaments; the antheræ didymous and erect. The *pistillum* has numerous germina collected into a head; the styli are pointed; the stigmata obtuse: There is no *pericarpium*; the receptaculum is globular: The seeds are very numerous.

Of this genus Dr Linnæus enumerates 21 species; but those valuable on account of the beauty of their flowers are only the following. 1. The nemorosa, which grows wild in the woods in many parts of Britain, where it flowers in April and May. The flowers are white, purple, or reddish purple, sometimes single, and sometimes double, so that they make a pretty appearance. 2. The appennina is likewise a native of Britain, growing in woods. The flowers of this species, like the last, are sometimes single, and sometimes double; their colours are white, blue, or violet. They appear in April. 3. The coronaria. 4. The hortensis. These two are natives of the Levant, particularly of the Archipelago islands, where the borders of the fields are covered with them of the most beautiful colours. When they grow wild, the flowers are commonly single; but by culture they are greatly improved: they become large and double, making some of the greatest ornaments of gardens. Their principal colours are red, white, purple, and blue; some of them are finely variegated with red, white, purple, and many intermediate shades of these colours.

Culture. The first and second sorts may be propagated by taking up their roots when the leaves decay, and transplanting them in wildernesses, where they will thrive and increase greatly, if they are not disturbed. The two last sorts require a good deal of care, and ample directions for their culture.—The soil in which these flowers will thrive extremely, may be composed in the following manner: Take a quantity of fresh untried earth (from a common or some other pasture land) that is of a light sandy loam or hazel mould, observing not to take it above ten inches deep below the surface; and if the turf be taken with it the better, provided it hath time to rot thoroughly before it is used: mix this with a third part of rotten cow-dung, and lay it in a heap, keeping it turned over at least once a month for eight or ten months, the better to mix it,

and rot the dung and turf, and to let it have the advantages of the free air. In doing this work, be careful to rake out all great stones, and break the clods; but by no means sift or screen the earth, which has been found very hurtful to many sorts of roots. This earth should be mixed twelve months before it is used, if possible: but if constrained to use it sooner, it must be the oftener turned over, to mellow and break the clods; observing to rake out all the parts of the green swaird that are not quite rotten, before it is used, as they would be prejudicial to the roots if suffered to remain. The beginning of September is a proper season to prepare the beds for planting, which (if in a wet soil) should be raised with this sort of earth six or eight inches above the surface of the ground, laying at the bottom some of the rakings of the heap to drain off the moisture; but, in a dry soil, three inches above the surface will be sufficient: this compost should be laid at least two feet and a half thick, and in the bottom there should be about four or five inches of rotten neats dung, or the rotten dung of an old melon or cucumber bed. The beds must be laid (if in a wet soil) a little round, to shoot off the water; but in a dry one, nearer to a level. In wet land, where the beds are raised above the surface, it will be proper to fill up the paths between them, in winter, either with rotten tan or dung, to prevent the frost from penetrating into the sides of the beds which otherwise may destroy their roots. The earth should be laid in the beds at least a fortnight or three weeks before the roots are planted, and a longer time would be yet better, that it may settle; and when they are planted, stir the upper part of the soil about six inches deep, with a spade; then rake it even and smooth, and with a stick draw lines each way of the bed at six inches distance, so that the whole may be in squares, that the roots may be planted regularly: then with three fingers make a hole in the centre of each square, about three inches deep, laying therein a root with the eye uppermost; and when the bed is finished, with the head of a rake draw the earth smooth, so as to cover the crown of the roots about two inches thick.

The best season for planting these roots, if for forward flowers, is about the latter end of September, and for those of a middle season any time in October: but observe to perform this work, if possible, at or near the time of some gentle showers; for if planted when the ground is perfectly dry, and there should no rain fall for three weeks or a month after, the roots will be very apt to grow mouldy upon the crown; and if once they get this distemper, they seldom come to good after.

As all the fine varieties of these flowers were first obtained from seeds, so no good florist that hath garden-room should neglect to sow them; in order to which, he should provide himself with a quantity of good roots of the single (or what the gardeners call *poppy*) anemones, of the best colours, and such as have strong stems and large flowers, but especially such as have more leaves than common, and also other good properties: these should be planted early, that they may have strength to produce good seeds, which will be ripe in three weeks or a month's time after the flowers are past; when the seeds must be carefully gathered, otherwise they will be blown away in a short time, as being inclosed in a downy substance. You must preserve this seed till the beginning of August, when you may either

Anemone.

Anemone. ther sow it in pots, tubs, or a well-prepared bed of light earth: in the doing of it you must be careful not to let your seeds be in heaps; to avoid which, the best method is to mix them with a little fine sand, and, when sown, gently streak the bed with a strong hair-brush.

In about two months after sowing, the plants will begin to appear, if the season has proved favourable. The first winter after their appearing above ground, they are subject to injuries from hard frosts, or too much wet, against both of which you must equally defend them: for the frost is very apt to loosen the earth, so that the young plants are often turned out of the ground, after which a small frost will destroy them; and too much wet often rots their tender roots, so that all your former trouble may be lost in a short time for want of care in this particular: nor is any thing more destructive to those tender plants than the cold black frosts and winds of February and March, from which you must be careful to defend them by placing a low reed-fence on the north and east sides of the bed, which may be moveable, and only fastened to a few stakes to support it for the present, and may be taken quite away as the season advances, or removed to the south and west sides of the bed, to screen it from the violence of the sun, which often impairs these plants when young. As the spring advances, if the weather should prove dry, you must gently refresh them with water, which will greatly strengthen your roots; and when the green leaves are decayed, if your roots are not too thick to remain in the same bed another year, you must clear off all the weeds and decayed leaves from the bed and sift a little more of the same prepared good earth, about a quarter of an inch thick over the surface, and observe to keep them clear from weeds during the summer season, and at Michaelmas repeat the same earthing; but as these roots so left in the ground will come up early in the autumn, the beds should be carefully covered in frosty weather, otherwise their leaves will be injured, whereby the roots will be weakened, if not destroyed. If your roots succeed well, many of them will flower the second year, when you may select all such as you like, by marking them with a stick: but you should not destroy any of them till after the third year, when you have seen them blow strong, at which time you will be capable to judge of their goodness; for until the roots have acquired strength, the flowers will not show themselves to advantage.

The single (or poppy) anemonies will flower most part of the winter and spring, when the seasons are favourable, if they are planted in a warm situation, at which time they make a fine appearance; therefore deserve a place in every flower garden, especially as they require little culture. There are some fine blue colours amongst these single anemonies, which, with the scarlets and reds, make a beautiful mixture; and as these begin flowering in January or February, when the weather is cold, they will continue a long time in beauty, provided the frost is not too severe, or if they are covered with mats. The seeds of these are ripe by the middle or end of May; and must be gathered daily as they ripen, otherwise they will be soon blown away by the winds.

Horned cattle, when removed from the higher grounds into woods and woody pastures, frequently eat

the wood-anemone; and, according to Linnæus and Gunner, many observations have proved that it causes the bloody flux among them.

Sea-ANEMONE. See *ANIMAL-Flower*.

ANEMOSCOPE, a machine that shows either the course or velocity of the wind. (See also the article *Wind-GAUGE*.)

The machine which shows the course of the wind, or from what point of the compass it blows, consists of an index moving about an upright circular plate, like the dial of a clock, on which the 32 points of the compass are drawn instead of the hours. The index, which points to the divisions on the dial, is turned by a horizontal axis, having a trundle-head at its external extremity. This trundle-head is moved by a cog-wheel on a perpendicular axis; on the top of which a vane is fixed, that moves with the course of the wind, and puts the whole machine in motion. The whole contrivance is extremely simple; and nothing required in the construction, but that the number of cogs in the wheel, and rounds in the trundle-head, be equal; because it is necessary, that, when the vane moves entirely round, the index of the dial also make a complete revolution.—An anemoscope of this kind is placed in one of the turrets of the queen's palace. The anemoscope, calculated for indicating the force or velocity of the wind, is the same with what most writers call an *anemometer*; and we have accordingly described one of those machines under that article. We shall here add another, contrived by the late Mr Pickering, and published in the *Philosophical Transactions*, N^o 473. This anemoscope is a machine four feet and a quarter high, consisting of a broad and weighty pedestal, a pillar fastened into it, and an iron axis of about half an inch diameter fastened into the pillar. Upon this axis turns a wooden tube; at the top of which is placed a vane, of the same materials, 21 inches long, consisting of a quadrant, graduated, and shod with an iron rim, notched to each degree; and a counterpoise of wood, as in the figure, on the other. Through the centre of the quadrant runs an iron pin, upon which are fastened two small round pieces of wood, which serve as moveable radii to describe the degrees upon the quadrant, and as handles to a velum or sail, whose pane is one foot square, made of canvas, stretched upon four battens, and painted. On the upper batten, next to the shod rim of the quadrant, is a small spring which catches at every notch corresponding to each degree, as the wind shall, by pressing against the sail, raise it up; and prevents the falling back of the sail, upon lessening of the force of the wind. At the bottom of the wooden tube, is an iron index, which moves round a circular piece of wood fastened to the top of the pillar on the pedestal, on which are described the 32 points of the compass. The figure of this machine is given on Plate XXIX. fig. 4. where *a* is the pedestal; *b*, the pillar on which the iron axis is fitted; *c*, the circle of wood, on which are described the 32 points of the compass; *e*, the wooden tube upon its axis; *f*, the velum; *g*, the graduated quadrant; *h*, the counterpoise of the vane. The adjoining figure represents the velum, which takes off: *a* is the plane of the velum; *b*, the spring; *c c*, the wooden radii; *d, d*, the holes through which the pin in the centre of the quadrant goes. Its uses are the following.

r. Ha-

Anemone,
Anemof-
cope.

Anemof-
cope,
Anethum.

1. Having a circular motion round the iron axis, and being furnished with a vane at top, and index at the bottom, when once you have fixed the artificial cardinal points, described on the round piece of wood on the pillar, to the same quarters of the heavens, it gives a faithful account of that quarter from which the wind blows. 2. By having a velum or sail elevated by the wind along the arch of the quadrant to an height proportionable to the power of the column of wind pressing against it, the relative force of the wind, and its comparative power, at any two times of examination, may be accurately taken. 3. By having a spring fitted to the notches of the iron with which the quadrant is shod, the velum is prevented from returning back upon the fall of the wind; and the machine gives the force to the highest blast, since the last time of examination, without the trouble of watching it.

The ingenious contriver of this machine tells us, that he carefully examined what dependence may be had upon it, during the storms of February 1743-4, and found that it answered exceeding well; for that, in such winds as the sailors call *violent storms*, the machine had six degrees to spare for a more violent gust, before it comes to a horizontal position. It is certainly to be depended upon in ordinary weather, the velum being hung so tenderly as to feel the most gentle breeze. There is however reason to fear, that the exposing the anemoscope to all winds for a continuance, must disorder it, especially irregular blasts and squalls. It may not therefore be amiss, in violent weather, for the observer to take the tube with its vane and velum in his hand, in order to know the force of the wind; and when he has finished his observations, to carry the machine into the house, till the violence of the storm is abated, when it may be replaced in its former situation.

ANETHUM, DILL and FENNEL: A genus of the digynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 45th order, *Umbellatae*. The essential characters are: the fruit is oval, compressed, striated; and the petals (five) are involute, entire, and very short.

Species. 1. The graveolens, or dill, is an annual plant: the root is long, slender, and white: the leaves are divided into a multitude of fine, long, narrow segments like those of fennel, but of a bluish green colour, and less strong smell. The stalk is round and firm, growing to the height of four feet, with yellow flowers in moderately large umbels. 2. The feniculum, or fennel; of which there are two varieties, the common and the sweet. The sweet fennel is smaller in all its parts than the common, except the seeds, which are considerably larger. The seeds of the two sorts differ likewise in shape and colour; those of the common are roundish, oblong, flattish on one side, and protuberant on the other, of a dark almost blackish colour; those of the sweet are longer, narrower, not so flat, generally crooked, and of a whitish or pale yellowish colour. Both sorts are cultivated in our gardens: the common is a perennial plant: the sweet fennel perishes after it has given seed; nor do its seeds come to such perfection in this climate as those which we receive from Germany.

Medicinal Uses. 1. Of the first species, *dill*, only the seeds are used. They are of a pale yellowish colour.

lour, in shape nearly oval, convex on one side, and flat on the other. Their taste is moderately warm and pungent; their smell aromatic, but not of the most agreeable kind. Several preparations of them are kept in the shops. They are recommended as a carminative in flatulent colics, proceeding from a cold cause or a viscosity of the juices.—2. Of *fennel* both the seeds and roots are used in medicine. The seeds of both the fennels have an aromatic smell, and a moderately warm pungent taste: those of the sweet fennel are in flavour most agreeable, and have also a considerable degree of sweetness; hence our colleges have directed the use of these only. They are ranked among the four greater hot seeds, and not undeservedly looked upon as good stomachics and carminatives. A simple water is prepared from them in the shops; they are ingredients also in the compound spirit of juniper, and some other officinal compositions. The root is far less warm, but has more of a sweetish taste, than the seeds: it is one of the five roots called *openers*; and has sometimes been directed in aperient apozems. Boerhaave says, that this root agrees in taste, smell, and medical qualities, with the celebrated *ginseng* of the Chinese; from which, however, it appears to be very considerably different.—The leaves of fennel are weaker than either the roots or seeds, and have very rarely been employed for any medicinal use.

ANEURISM, in surgery, a throbbing tumor, distended with blood, and formed by a dilatation or rupture of an artery. See *SURGERY-Index*.

ANGARI, or **ANGARII**, in antiquity, denote public couriers, appointed for the carrying of messages. The ancient Persians, Budæus observes, had their *αγγαρίων δρομῖκᾱ*; which was a set of couriers on horseback, posted at certain stages or distances, always in readiness to receive the dispatches from one, and forward them to another, with wonderful celerity, answering to what the moderns call *posts*, q. d. *positi*, as being posted at certain places or stages.—The angari were also called by the Persians *astande*; by the Greeks *ἡμεροδρομοί*, on account of the long journeys they made in one day, which according to Suidas amounted not to less than 1500 stadia.

ANGARIA, in Roman antiquity, a kind of public service imposed on the provincials, which consisted in providing horses and carriages for the conveyance of military stores and other public burdens. It is sometimes also used for a guard of soldiers, posted for the defence of a place. In a more general sense it is used for any kind of oppression or services performed thro' compulsion.

ANGAZYA, one of the Comorra islands, lying between the north end of Madagascar and the coast of Zanguebar in Africa, from Lat. 10° to 15° S. It is inhabited by Moors, who trade with divers parts of the continent, in cattle, fruits, and other commodities of the island; which they exchange for calicoes and other cotton cloths. The houses here are built of stone, and lime made of calcined oyster-shells; with which the walls and roof are plastered in a very elegant manner. The government of Angazya is a pure aristocracy; the island being subject to 10 lords, who have all the title of *Sultan*. The people are very careful of their women; never permitting strangers to see them, without permission from a sultan, or an order which

Anchrisma
||
Angazya.

Angiotomy,
Angel.

the stranger brings with him. Many of them read and write Arabic with great facility; and some even understand Portuguese, which they learn from their intercourse with Mosambique, whither they trade in vessels of 40 tons burthen.

ANGEIOTOMY, in surgery, implies the opening a vein or artery, as in bleeding; and consequently includes both arteriotomy and phlebotomy.

ANGEL, a spiritual intelligent substance, the first in rank and dignity among created beings. The word *Angel* is Greek, and signifies a *Messenger*: the Hebrew *מלאך* signifies the same thing. The angels are in Daniel (chap. iv. ver. 13, &c.) called *מְרַאֲאֵי*, or *Watchers*, from their vigilance: for the same reason they are, in the remains we have of the prophecy attributed to Enoch, named *Egregori*; which word imports the same in Greek.

Angels, therefore, in the proper signification of the word, do not import the nature of any being, but only the office, to which they are appointed, especially by way of message, or intercourse between God and his creatures; in which sense they are called the *ministers of God*, who do his pleasure, and *ministering spirits* sent forth to minister for them who shall be heirs of salvation. That there are such beings as we call *angels*, that is, certain permanent substances, invisible, and imperceptible to our senses, endued with understanding and power superior to that of human nature, created by God, and subject to him as the supreme Being; ministering to his divine providence in the government of the world by his appointment, and more especially attending the affairs of mankind; is a truth so fully attested by Scripture, that it cannot be doubted. Nay, the existence of such invisible beings was generally acknowledged by the ancient heathens, though under different appellations: the Greeks called them *demons*; and the Romans *genii*, or *lares*. Epicurus seems to have been the only one among the old philosophers who absolutely rejected them. Indeed, the belief of middle intelligences influencing the affairs of the world, and serving as ministers or interpreters between God and man, is as extensive as the belief of a God; having never, so far as we know, been called in question by those who had any religion at all.

When created.

The creation of angels is not indeed expressly mentioned by Moses in the first of Genesis, yet it is generally considered by judicious expositors as implied. The reason why the sacred historian is silent on this subject, is supposed by Berrington to be the natural proneness

* On the Creation, p. 81. See also Severianus on the Creation. of the gentile world, and even of the Jews, to idolatry*. And it is thought, if they worshipped mere material elements, which was the case, much more might they be inclined to worship such superior and sublime beings as angels. But a better reason is perhaps given by other writers, viz. that this first history was purposely and principally for information concerning the visible world; the invisible, of which we know but in part, being reserved for a better life†.

† Assemblies' Annot. on Gen. i. 30.

† Works, p. 505.

On what day they were created has been matter of conjecture. It is a point on which learned men have differed. The Socinians, indeed, hold, says Bishop Hopkins†, that it was long before the account given by Moses, but it must have been within the six days creation; because, as we are informed, that within this space God made heaven and earth, and all things that

are therein. All the writers that we have seen on this subject, think they were included in the first day's work, when the heavens were framed.

It has been thought by some persons, that the words of Job, "When the morning stars sang together, and all the sons of God shouted for joy," militate against the creation of angels within the six days. About the meaning of these words, however, expositors are not agreed; but admitting that they refer literally to angels, Dr Lightfoot, Caryl, and others, see no difficulty in the passage. The Doctor thinks they were created on the first day, with the heavens; and that they were spectators of God's works in the other parts of creation, and praised and magnified the Lord for his works all along; singing and shouting when God laid the foundation of the earth, as the Jews did at the laying the foundation of the temple, Ezra iii.

On a subject of this nature, it would be imprudent to indulge a spirit of conjecture: Scripture is the only standard by which truth and error can be tried, and to this we must ultimately appeal. It is acknowledged that Moses has not expressly mentioned angels by name; yet, as we have remarked, their creation is undoubtedly implied: for the heavens must include all that are in them; and therefore it is that the divine penman says, in the conclusion of his narrative, "Thus the heavens and the earth were finished, and all the host of them." Of the *hosts* of heaven, the angels must form a considerable part; they are expressly called the *heavenly host*, and the *armies of heaven*, Dan. iv. 35. Luke ii. 13. And if divine authority be admitted as decisive, the reasons adduced by Jehovah for the sanctification of a sabbath, demonstrate that they did not exist previous to the creation of the heavens. It is, surely, asserted with propriety, that in *six days* the Lord made Heaven and earth, the sea, and *ALL* that in them is. Similar to which is a declaration of the divine historian relating to the same fact.—"And God blessed the seventh day, and sanctified it; *because* that in it he had rested from *ALL* his work which God created and made," Gen. ii. 3. Now if angels existed prior to the six days of creation, the language of Moses is far from being accurate and intelligible; and especially when it is considered that the obscurity might have been removed by adding, "from all the work which God had *then* created and made."

But if angels were created before the heavens, where could they exist? For, as the learned Gill|| has remarked, "though angels have no bodies, and so are not in place circumscriptively; yet as they are creatures, they must have an *ubi*, a somewhere in which they are definitively; so that they are here, and not there, and much less every where: Now where was there an *ubi*, a somewhere, for them to exist in, before the heavens and the earth were made? It is most reasonable, therefore, to conclude, that as God prepared an habitation for all the living creatures before he made them; as the sea for the fishes, the expanse, or air, for the fowls, and the earth for men and beasts; so he made the heavens first, and then the angels to dwell in them."

That this was the fact, will appear very evident, if the words of Moses be impartially considered. "In the beginning (says he), God created the heavens and the earth;" which words must refer to either the beginning of *creation* or of *time*: if to the former, and angels previously existed, the language is neither *intelligible*

|| Bod. Divin. vol. I. p. 422.

Angel. *ligible* nor conformable to *truth*; if to the latter, the difficulty remains; for what is time but the measure of created existence. "Time (says the judicious Char-

* Works, nock*) began with the foundation of the world: before the beginning of the creation and the beginning of time, there could be nothing but eternity; nothing but what was uncreated, that is, nothing but what was without beginning." But if angels were in a pre-existent state, the historian's language is unaccountably strange and inaccurate: for if the phrase *in the beginning*, which is remarkably emphatical, refer to the creation of the heavens and the earth *only*, they are unhappily expressed; so expressed, indeed, as to convey no meaning to those who consider words as the vehicle of thought, and as intended to express clearly to others the meaning of the writer. For the *natural obvious* sense is as follows—"In the beginning of the creation of the heavens and the earth, God created the heavens and the earth;" which language is not only a departure from that perspicuity and precision which distinguish all his narrations, but entirely irrational and absurd.

That the words *in the beginning* refer to the first creation, cannot be doubted, if it be remembered that JOHONAH himself founds a claim to *eternity* on this very ground: "Before the day was, I am he."—"Before the mountains were brought forth, or ever thou hadst formed the earth and the world, even from everlasting to everlasting, thou art God." Isa. xliii. 13. Ps. ix. 2. See also Prov. viii. 22, 23, &c. Now there could be no propriety in this kind of reasoning, if angels or any other creature existed before the creation of the world, because all claims to eternity from such premisses would apply even to Gabriel as well as to JEHOVAH. "Before the world was," is, in Scripture language, a phrase always expressive of eternity; and on this principle the evangelist John asserts the divinity of Jesus Christ in the first chapter of his history. For this purpose he alludes to the words of Moses, and introduces his divine master to notice by celebrating the first act of his creative power. "In the beginning (says he) was the word;" that is, Dr Doddridge remarks §, before the foundation of the word, or the first production of any creature: and Dr Sherlock † is clearly of opinion, that the words, in their most common and usual acceptation, signify the first creation of all things, and are a demonstration of the divinity of Christ ‡. Of the same mind was Dr Owen. He says, that if the phrase *beginning* does not absolutely and formally express *eternity*, yet it doth a pre-existence to the whole creation, which amounts to the same thing; for nothing can pre-exist before all creatures but the nature of God, which is eternal, unless we suppose a creature before the creation of any. But what is meant by this expression is fully declared by other passages of Scripture: "I was set up from everlasting, before the *beginning*, or ever the earth was;" "Glorify thou me with thine own self, with the glory which I had with thee before the world was;" both which passages not

only explain the text, but undeniably prove the pre-existence of Christ the Son of God*. It should be remembered, that, in the passage under consideration, the Evangelist's argument for the *divinity* of Jesus Christ is grounded on his pre-existing the creation of the world; and it is consequently asserted, that he is the creator of all things: but if angels had a being before the period to which he alludes, the argument loses all its force, and no more proves the divinity of Christ than the divinity of an angel (A).

If, therefore, the words of Moses be impartially viewed in their obvious natural meaning, and compared with other passages of Scripture that relate to the same subject, we have no doubt but every unprejudiced mind will perceive, that as he intended to give a summary history of the creation of all things both in heaven and in earth, he has done it in language intelligible and accurate, and in terms sufficiently explicit.

As to the nature of these beings, we are told, that they are spirits; but whether pure spirits divested of all matter, or united to some thin bodies, or corporeal vehicles, has been a controversy of long standing. Not only the ancient philosophers, but some of the Christian fathers, were of opinion, that angels were clothed with ethereal, or fiery, bodies, of the same nature with those which we shall one day have when we come to be equal to them. But the more general opinion, especially of later times, has been, that they are substances entirely spiritual, though they can at any time assume bodies, and appear in human or other shapes.

That the angelical powers and abilities vastly excel those of man, cannot be denied, if we consider, that their faculties are not clogged or impeded, as ours are, by any of those imperfections which are inseparable from corporeal being: so that their understandings are always in perfect vigour; their inclinations regular; their motions strong and quick; their actions irresistible by material bodies, whose natural qualities they can controul, or manage to their purposes, and occasion either blessings or calamities, public or private, here below; instances of which are too numerous to mention.

Besides their attendance on God, and their waiting and executing of his commands, they are also presumed to be employed in taking care of mankind and their concerns: and that every man had such a tutelar or guardian angel, even from his birth, was a firm belief and tradition among the Jews; and our Saviour himself seems to have been of the same sentiment. The heathens were also of the same persuasion, and thought it a crime to neglect the admonitions of so divine a guide. Socrates publicly confessed himself to be under the direction of such an angel, or dæmon, as several others have since done. And in this tutelar genius of each person they believed his happiness and fortune depended. Every genius did his best for the interest of his client; and if a man came by the worst, it was a sign the strength of his genius was inferior to

5 H 2

that

(A) Of this Socinus and his followers were aware; and therefore artfully endeavoured to evade the force of the apostle's reasoning, by interpreting the phrase *in the beginning* either in a figurative sense, or as referring to the beginning of John the Baptist's ministry. We will only subjoin, that we do not remember to have seen any writer deviate from the primary obvious meaning of the passage, who had not some hypothesis to support inimical to truth.

§ Family Expositor.

† Script. Proof of Christ's Divin. p. 129. See also Whitby on John i. 1.

Angel. * On the Trinity, p. 43.

Angel. that of his opponent, that is, of an inferior order; and this was governed by chance. There were some genii, whose ascendent was so great over others, that their very presence entirely disconcerted them; which was the case of that of Augustus in respect of that of Marc Anthony; and for the same reason, perhaps, some persons have wit, and speak well, when others are absent, in whose presence they are confounded, and out of countenance. The Romans thought the tutelar genii of those who attained the empire, to be of an eminent order; on which account they had great honours shown them. Nations and cities also had their several genii. The ancient Persians so firmly believed the ministry of angels, and their superintendence over human affairs, that they gave their names to their months, and the days of their month; and assigned them distinct offices and provinces: and it is from them the Jews confess to have received the names of the months and angels, which they brought with them when they returned from the Babylonish captivity. After which, we find, they also assigned charges to the angels, and in particular the patronage of empires and nations; Michael being the prince of the Jews, as Raphael is supposed to have been of the Persians.

The Mahometans have so great a respect for the angels, that they account a man an infidel who either denies their existence, or loves them not. They believe them to be free from sin, enjoying the presence of God, to whom they are never disobedient: that they have subtle pure bodies, being created of light; and have no distinction of sexes, nor do they need the refreshment of food or sleep. They suppose them to have different forms and offices: that some adore God in several postures; others sing his praises, and intercede for men; some carry and encompass his throne; others write the actions of men, and are assigned guardians to them.

As the numbers of these celestial spirits are very great, it is likewise reasonable to believe that there are several orders and degrees among them; which is also confirmed by Scripture; whence some speculative men have distributed them into nine orders, according to the different names by which they are there called; and reduced those orders into three *hierarchies*, as they call them; to the first of which belong seraphim, cherubim, and thrones; to the second, dominions, virtues, and powers; and to the third principalities, arch-angels, and angels. They imagine farther, that there are some who constantly reside in heaven; others who are ministers, and sent forth, as there is occasion, to execute the orders they receive from God by the former. The Jews reckon but four orders or companies

of angels, each headed by an arch-angel; the first order being that of Michael, the second of Gabriel, the third of Uriel, and the fourth of Raphael: but though the Jews believe them to be four, yet it seems there were rather seven. The Persians also held, there were subordinate degrees among the angels.

Although the angels were originally created perfect, Of the fall-good, and obedient, to their Master's will, yet some of them sinned, and kept not their first estate, but left their habitation; and so, of the most blessed and glorious, became the most vile and miserable of all God's creatures. They were expelled the regions of light, and cast down to hell, to be reserved in everlasting chains under darkness, until the day of judgment. With heaven they lost their heavenly disposition, which delighted once in doing good and praising God; and fell into a settled rancour against him, and malice against men: their inward peace was gone; all desire of doing good departed from them; and, instead thereof, revengeful thoughts and despair took possession of them, and created an eternal hell within them.

When, and for what offence, these apostate spirits fell from heaven, and plunged themselves into such an abyss of wickedness and woe, are questions very hard, if not impossible, to be determined by any clear evidence of Scripture. As to the time, we are certain that it could not be before the sixth day of creation; because on that day it is said, "God saw every thing that he had made, and behold it was very good:" but that it was not long after is very probable, as it must have preceded the fall of our first parents. Some have imagined it to have been after; and that carnality, or lusting to converse with women upon earth, was the sin which ruined them: an opinion (A) built on a mistaken interpretation of Scripture, as if angels were meant by *the sons of God* who are said to have begotten the mighty men of old on the daughters of men. Others have supposed, that the angels, being informed of God's intention to create man after his own image, and to dignify his nature by Christ's assuming of it, and thinking their glory to be eclipsed thereby, envied man's happiness, and so revolted: and with this opinion that of the Mahometans has some affinity; who are taught, that the devil, who was once one of those angels who are nearest to God's presence, and named *Azazel*, forfeited paradise for refusing to pay homage to Adam at the command of God. But on what occasion soever it first showed itself, pride seems to have been the leading sin of the angels; who, admiring and valuing themselves too much on the excellence of their nature and the height of their station, came at length to entertain so little respect for their Creator,

(A) This opinion seems to have been originally occasioned by some copies of the Septuagint, which, in the days of St Austin, had in this place *the angels of God*. Lactantius supposes the angels, who were guilty of this enormity, had been sent down by God to guard and take care of mankind; and being endued with free-will, were charged by him not to forfeit the dignity of their celestial nature, by defiling themselves with the corruptions of the earth; but that the devil at length enticed them to debauch themselves with women. He adds, that, being not admitted into heaven by reason of the wickedness into which they had plunged themselves, they fell down to the earth, and became the devil's ministers; but that those who were begotten by them, being neither angels nor men, but of a middle nature, were not received into hell, no more than their parents were into heaven. Hence arose two kinds of *dæmons*, celestial and terrestrial. These are unclean spirits, the authors of whatever evils are committed, and whose prince is the devil. From hence very probably proceeded the notions of *Incubi*, or *dæmons* who are supposed to have carnal knowledge of women.

Angel.
||
Angelica.

Creator, as to be guilty of downright rebellion and apostasy.

It is certain from Scripture, that these fallen angels was in great numbers, and that there were also some order and subordination preserved among them; one especially being considered as their prince, and called by several names, *Beelzebub*, *Satan*, or *Sammaël* by the Jews; *Abdrimam* by the Persians; and *Eblis*, by the Mahometans. Their constant employment is not only doing evil themselves, but endeavouring by all arts and means to seduce and pervert mankind, by tempting them to all kind of sin, and thereby bringing them into the same desperate state with themselves.

ANGEL is likewise a title given to bishops of several churches. In this sense is St Paul understood by some authors, where he says, *Women ought to be covered in the church, because of the angels*. The learned Dr Prideaux observes, that the minister of the synagogue, who officiated in offering up the public prayers, being the mouth of the congregation, delegated by them as their representative, messenger, or angel, to speak to God in prayer for them, was therefore, in the Hebrew language, called the *angel* of the church; and from thence the bishops of the seven churches of Asia are, by a name borrowed from the synagogue, called the *angels* of those churches.

ANGEL, in commerce, the name of a gold coin formerly current in England. It had its name from the figure of an angel represented upon it, weighed four pennyweights, and was twenty-three and a half carats fine. It had different values in different reigns; but is at present only an imaginary sum, or money of account, implying, ten shillings.

ANGEL-Fish, in ichthyology, a species of squalus. See SQUALUS.

ANGELIC, or ANGELICAL, something belonging to, or that partakes of, the nature of angels. We say an *angelical* life, &c. St Thomas is styled the *angelical doctor*. The angelical salutation is called by the Romanists *Ave Maria*; sometimes simply *angelus*.

ANGELIC Garment (*Angelica vestis*), among our ancestors, was a monkish garment, which laymen put on a little before their death, that they might have the benefit of the prayers of the monks. It was from them called *angelical*, because they were called *angeli*, who by these prayers *animæ salutis succurrebant*. Hence, where we read the phrase *monachus ad succurrendum* in our old books, it must be understood of one who had put on the habit when he was at the point of death.

ANGELICA: A genus of the digynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 45th order, *Umbellatæ*. The essential characters are: The fruit is roundish, angled, solid, with reflected styli; the corollæ are equal, and the petals incurved.

Species. 1. The fativa, or common angelica, which is cultivated in gardens for medicinal use, and likewise for a sweatmeat, grows naturally in the northern countries. The root of this species is brown, oblong, and an inch or two thick, fragrant, and acrid. The leaves are very large, composed of pinnated foliola, of an oblong oval figure, dentated at the edge, and the odd leaf at the end of the pinna lobated; the stalk is round, striated, and as thick as a child's arm. The umbels are very large, and of a globose figure; the flowers

very small, and greenish. 2. The arch-angelica is a native of Hungary and Germany. The leaves are much larger than those of the former, and the flowers are yellow. 3. The sylvestris grows naturally in moist meadows, and by the sides of rivers, in many parts of Britain; so is seldom admitted into gardens. 4. The atro-purpurea canadensis. 5. The lucida canadensis: These are natives of North America, but have neither beauty nor use.

Culture. The common angelica delights to grow in a moist soil: the seeds should be sown soon after they are ripe. When the plants come up about six inches high, they should be transplanted very wide, as their leaves spread greatly. If they are planted on the sides of ditches or pools of water, about three feet distance, they will thrive exceedingly.

Medicinal Uses. For the purposes of medicine, Bohemia and Spain produce the best kinds of angelica. The London college direct the roots brought from Spain to be alone made use of. Angelica roots are apt to grow mouldy, and be preyed upon by insects, unless thoroughly dried, kept in a dry place, and frequently aired. It is probable that the roots which are subject to this inconvenience might be preserved, by dipping them in boiling spirit, or exposing them to its steam, after they are dried.

All the parts of angelica, especially the root, have a fragrant aromatic smell, and a pleasant bitterish warm taste, glowing upon the lips and palate for a long time after they have been chewed. The flavour of the seeds and leaves is very perishable, particularly that of the latter, which, on being barely dried, lose the greatest part of their taste and smell: the roots are more tenacious of their flavour, though even these lose part of it upon keeping. The fresh root, wounded early in the spring, yields an odorous yellow juice, which, slowly exsiccated, proves an elegant gummy resin, very rich in the virtues of the angelica. On drying the root, this juice concretes into distinct molecularæ, which, on cutting it longitudinally, appear distributed in little veins: in this state, they are extracted by pure spirit, but not by watery liquors.

Angelica is one of the most elegant aromatics of European growth, though little regarded in the present practice. The root, which is the most efficacious part, is used in the aromatic tincture; and the stalks make an agreeable sweet meat.

ANGELICS, (ANGELICI), in church-history, an ancient sect of heretics, supposed by some to have got this appellation from their excessive veneration of angels; and by others, from their maintaining that the world was created by angels.

ANGELICS is also the name of an order of knights, instituted in 1191, by Angelus Flavius Comnenus emperor of Constantinople.

ANGELICS is also a congregation of nuns, founded at Milan in 1534, by Louisa Torelli, countess of Guastalla. They observe the rule of St Augustine.

ANGELITES, in ecclesiastical history, a sect of Christian heretics, in the reign of the emperor Anastasius, and the pontificate of Symmachus, about the year 494, so called from Angelium, a place in the city of Alexandria, where they held their first meetings. They were called likewise *Severites*, from one Severus, who was the head of their sect; as also *Theodosians*, from

Angelica
||
Angelites.

Angelo,
Angelos.

one among them named Theodosius, whom they made pope at Alexandria. They held, that the persons of the Trinity are not the same; that none of them exists of himself, and of his own nature; but that there is a common god or deity existing in them all, and that each is God, by a participation of this deity.

ANGELO (Michael). There were five celebrated Italian painters of this name, who flourished in the 16th and 17th centuries; but the two most distinguished of them are these.—First, Michael Angelo Buonarotti, who was a most incomparable painter, sculptor, and architect, born in 1474, in the territory of Arezzi in Tuscany. He was the disciple of Dominico Ghirlandajo; and erected an academy of painting and sculpture in Florence, under the protection of Lorenzo di Medici; which, upon the troubles of that house, was obliged to remove to Bologna. About this time he made an image of Cupid, which he carried to Rome, broke off one of its arms, and buried the image in a place he knew would soon be dug up, keeping the arm by him. It was accordingly found, and sold to Cardinal St Gregory for an antique; until Michael, to their confusion and his own credit, discovered his artifice, and confirmed it by the deficient arm which he produced: it is rather unusual for the manufacturers of antiques to be so ingenuous. His reputation was so great at Rome, that he was employed by pope Sixtus to paint his chapel; and by the command of pope Paul III. executed his most celebrated piece *The last judgment*. He has the character of being the greatest designer that ever lived; and it is universally allowed that no painter ever understood anatomy so well. He died immensely rich at Rome, in 1564.—Secondly, Michael Angelo de Caravaggio, born at that village in Milan, in 1569. He was at first no more than a bricklayer's labourer: but he was so charmed with seeing some painters at work, that he immediately applied himself to the art; and made such a progress in a few years, that he was admired as the author of a new style in painting. It was observed of Michael Angelo Buonarotti, that he was incomparable in designing, but knew little of colouring; and of Caravaggio, that he had as good a goût in colouring as he had a bad one in designing. There is one picture of his in the Dominican church at Antwerp, which Rubens used to call his master. It is said of this painter, that he was so strangely contentious, that the pencil was no sooner out of his hand but his sword was in it. He died in 1609.

ANGELO (St.) a small but strong town of Italy, in the Capitanata. There are several other towns and castles of the same name in Italy, and particularly the castle of St Angelo at Rome. E. Long. 15. 56. N. Lat. 41. 43.

ANGELOS (Los), a province of Mexico, the ancient republic of Tlascala, of which a city called *Tlascala* was once the capital. That city is now reduced to an inconsiderable village, and has given place to another called *Puebla des los Angelos*, or the city of Angels. It is situated in W. Long. 103. 12. and N. Lat. 19. 13. It was formerly an Indian town; but in 1530 was entirely abandoned by the natives, on account of the cruelties of the Spaniards. A succeeding viceroy of Mexico, by a milder treatment, recalled them; and the town is now exceedingly rich and populous, so as even to vie with Mexico itself in

magnificence. It is situated on the river Zacatula, in a fine valley, about 25 leagues to the eastward of Mexico. In the middle is a beautiful and spacious square, from whence run the principal streets in direct lines, which are crossed by others at right angles. One side is almost entirely occupied by the magnificent front of the cathedral; while the other three consists of piazzas, under which are the shops of tradesmen. The city is the see of a bishop, suffragan to the archbishop of Mexico, and we may form a judgment of the wealth of the place by the revenue of the cathedral and chapter, which amounts to 300,000 pieces of eight annually. It must be remembered, however, that in all popish countries the wealth of the laity by no means bears the same proportion to that of the clergy as in Britain. What contributes greatly to encrease the riches of this province is, that here is situated the city of Vera Cruz, the natural centre of all the American treasures belonging to Spain. See VERA CRUZ.

ANGELOT, an ancient English gold coin, struck at Paris, while under subjection to the English. It was thus called from the figure of an angel supporting the scutcheon of the arms of England and France. There was another coin of the same denomination struck under Philip de Valois.

ANGELOT is also used in commerce to denote a small, fat, rich sort of cheese, brought from Normandy. Skinner supposes it to have been thus called from the name of the person who first made it up in that form, and perhaps stamped it with his own name. Menage takes it to have been denominated from the resemblance it bears to the English coin called *angelot*. It is made chiefly in the Pays de Bray, whence it is also denominated *angelot de Bray*. It is commonly made in vats, either square or shaped like a heart.

ANGER, a violent passion of the mind, consisting in a propensity to take vengeance on the author of some real or supposed injury done the offended party.

Anger is either deliberative or instinctive; and the latter kind is rash and ungovernable, because it operates blindly, without affording time for deliberation or foresight. Bishop Butler very justly observes, that anger is far from being a selfish passion, since it is naturally excited by injuries offered to others as well as to ourselves; and was designed by the Author of nature not only to excite us to act vigorously in defending ourselves from evil, but to interest us in the defence or rescue of the injured and helpless, and to raise us above the fear of the proud and mighty oppressor.

Neither, therefore, is all anger sinful: hence the precept, "Be ye angry and sin not."—It becomes sinful, however, and contradicts the rule of scripture, when it is conceived upon slight and inadequate provocations, and when it continues long. It is then contrary to the amiable spirit of charity, which "suffereth long, and is not easily provoked." Hence these other precepts, "Let every man be slow to anger;" and, "Let not the sun go down upon your wrath."

These precepts, and all reasoning indeed upon the subject, suppose the passion of anger to be within our power: and this power consists not so much in any faculty we have of appeasing our wrath at the time (for we are passive under the smart which an injury or affront occasions, and all we can then do is to prevent its breaking out into action), as in so mollifying our minds.

Angelot,
Anger.

Anger. minds by habits of just reflection, as to be less irritated by impressions of injury, and to be sooner pacified.

• Book III.
Part ii.
chap. 7.

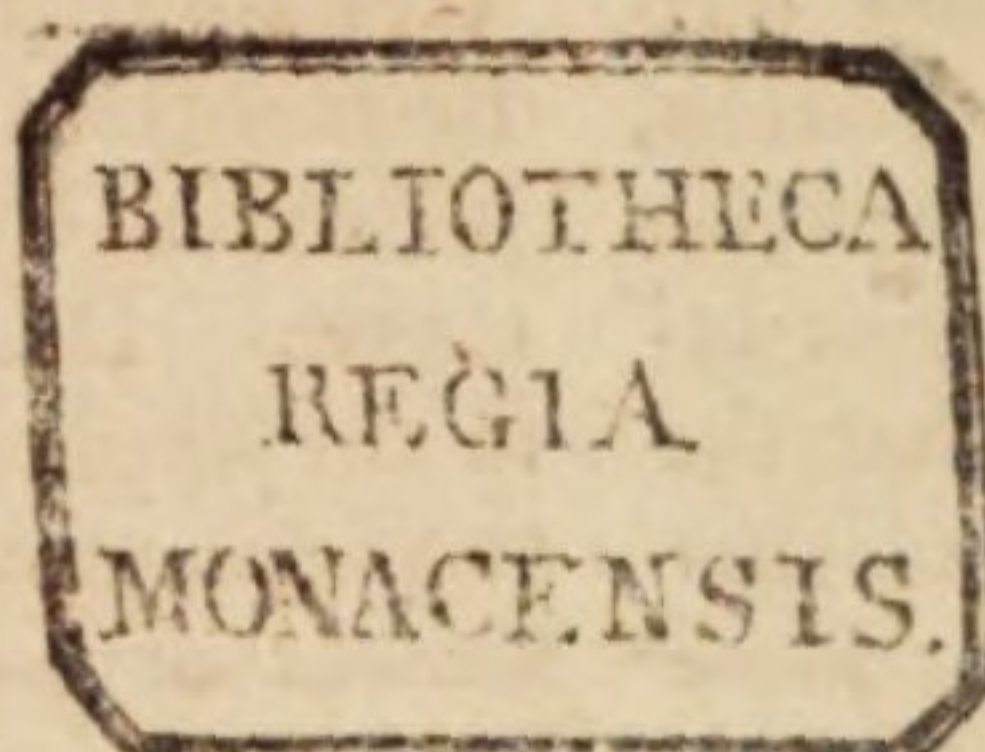
As reflections proper for this purpose, and which may be called the *sedatives* of anger, the following are suggested by Archdeacon Paley in his excellent treatise of *Moral and Political Philosophy**—“The possibility of mistaking the motives from which the conduct that offends us proceeded; how often *our* offences have been the effect of inadvertency, when they were mistaken for malice; the inducement which prompted our adversary to act as he did, and how powerfully the same inducement has, at one time or other, operated upon ourselves; that he is suffering perhaps under a contrition, which he is ashamed, or wants opportunity, to confess; and how ungenerous it is to triumph by coldness or insult over a spirit already humbled in secret; that the returns of kindness are sweet, and that there is neither honour nor virtue nor use in resisting them—for some persons think themselves bound to cherish and keep alive their indignation, when they find it dying away of itself. We may remember that others have their passions, their prejudices, their favourite aims, their fears, their cautions, their interests, their sudden impulses, their varieties of apprehension, as well as we: we may recollect what hath sometimes passed in our own minds, when we have got on the wrong side of a quarrel, and imagine the same to be passing in our adversary's mind now; when we became sensible of our misbehaviour, what palliations we perceived in it, and expected others to perceive; how we were affected by the kindness, and felt the superiority, of a generous reception and ready forgiveness; how persecution revived our spirits with our enmity, and seemed to justify the conduct in ourselves which we before blamed. Add to this, the indecency of extravagant anger; how it renders us, whilst it lasts, the scorn and sport of all about us, of which it leaves us, when it ceases, sensible and ashamed; the inconveniences and irretrievable misconduct into which *our* irascibility has sometimes betrayed us; the friendships it has lost us; the distresses and embarrassments in which we have been involved by it, and the sore repentance which on one account or other it always costs us.

“But the reflection calculated above all others to allay that haughtiness of temper which is ever finding out provocations, and which renders anger so impetuous, is that which the gospel proposes; namely, that we ourselves are, or shortly shall be, suppliants for mercy and pardon at the judgment-seat of God. Imagine our secret sins all disclosed and brought to light; imagine us thus humbled and exposed; trembling under the hand of God; casting ourselves on his compassion; crying out for mercy—imagine such a creature to talk of satisfaction and revenge, refusing to be intreated, disdaining to forgive, extreme to mark and to resent what is done amiss: imagine, I say, this; and you can

hardly feign to yourself an instance of more impious and unnatural arrogance.”

Anger.

Physicians and naturalists afford instances of very extraordinary effects of this passion. Borrichius cured a woman of an inveterate tertian ague, which had baffled the art of physic, by putting the patient in a furious fit of anger. Valeriola made use of the same means, with the like success, in a quartan ague. The same passion has been equally salutary to paralytic, gouty, and even dumb persons; to which last it has sometimes given the use of speech. Etmuller gives divers instances of very singular cures wrought by anger; among others, he mentions a person laid up in the gout, who, being provoked by his physician, flew upon him, and was cured. It is true, the remedy is somewhat dangerous in the application, when a patient does not know how to use it with moderation. We meet with several instances of princes to whom it has proved mortal; *e. g.* Valentinian the first, Wenceslas, Matthias Corvinus king of Hungary, and others. There are also instances wherein it has produced the epilepsy, jaundice, cholera-morbus, diarrhoea, &c. In fact, this passion is of such a nature, that it quickly throws the whole nervous system into preternatural commotions, by a violent stricture of the nervous and muscular parts; and surprisingly augments not only the systole of the heart and of its contiguous vessels, but also the tone of the fibrous parts in the whole body. It is also certain, that this passion, by the spasmodic stricture it produces in the parts, exerts its power principally on the stomach and intestines, which are highly nervous and membranous parts; whence the symptoms are more dangerous, in proportion to the greater consent of the stomach and intestines, with the other nervous parts, and almost with the whole body. The unhappy influence of anger likewise, on the biliary and hepatic ducts, is very surprising; since by an intense constriction of these, the liver is not only rendered scirrhus, but stones also are often generated in the gall-bladder and biliary ducts: these accidents have scarcely any other origin than an obstruction of the free motion and efflux of the bile, by means of this violent stricture. From such a stricture of these ducts likewise proceeds the jaundice, which in process of time lays a foundation for calculous concretions in the gall-bladder. Lastly, by increasing the motion of the fluid, or the spasms of the fibrous parts, by means of anger, a larger quantity of blood is propelled with an impetus to certain parts; whence it happens that they are too much distended, and the orifices of the veins distributed there opened. It is evident from experience, that anger has a great tendency to excite enormous hæmorrhagies, either from the nose, the aperture of the pulmonary artery, the veins of the anus; or in women, from the uterus, especially in those previously accustomed and disposed to such evacuations.



DIRECTIONS FOR PLACING THE PLATES OF VOL. I.

PART I.			(Part II. continued.)		
Plate.		Page.	Plate.		Page.
I.		92	XIV.		632
II.		200	XV.		644
2d II.		208	XVI.		647
III.		228	XVII.		694
IV.		272	XVIII.		695
V.		277	XIX.		696
VI.		280	XX.		698
VII. }			XXI. }		724
2d VII. }		320	XXII. }		756
VIII.		338	XXIII.		762
			XXIV.		
			XXV.		
PART II.			XXVI. }		744
IX. }			XXVIII. }		
X. }		496	XXVII.		768
XI.		506	XXIX.		786
XII. }					
XIII. }		538			

[In all, 34 Plates.]

Encyclopaedia britannica or a dictionary of arts, sciences and
miscellaneous literature

Bd.: 1,2

Edinburgh (1810)

4 Enc. 7-1,2

urn:nbn:de:bvb:12-bsb10351494-8